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Some account of the Botanical Collection, brought from the eastward, in 1841, *by Dr.* Cantor. *By the late* W. Griffith *Esq., F. L. S. Memb. Imp. Acad. Natur. Curios.,—Royal Ratisb. Botan. Soc., —Corr. Memb. Hort. Soc.,—Royal Acad. Turin,—Assist. Surgeon, Madras Establishment.*

Note.—The following paper has been printed for several years and was intended to form part of an interesting communication by Dr. Cantor on the Natural History of Chusan which was to lead off Vol. XXI. of the Asiatic Researches. This publication having been, for the present at all events, discontinued, Dr. Griffith's valuable Memoir on Chusan Botany has been reprinted and is now published with the four plates which accompanied it.—Ed.

This collection consists of Plants from the Straits of Malacca, from Lantao, Chusan, and a few from Pekin: the bulk of the Chinese Plants being from Chusan. The Straits' specimens were, I believe, given to Dr. Cantor by the Rev. Mr. White, Chaplain of Singapore.

The following lists exhibit the genera and the number of species procured from the above-mentioned localities: the names of a few species being added:—

STRAITS OF MALACCA.

ACOTYLEDONES.

		No. of Species
Lycopodineæ,	Lycopodium,	3
Filices,	Lygodium,	1
	Gleichenia,	2
	Polypodium,	3
	Aspidium,	1
	Asplenium,	1
	Blechnum,	1
	Pteris,	1
	Total,	13

DICOTYLEDONES.

Incompletæ.

Taxineæ ?,	Dacrydium ?	1
Urticeæ,	Ficus,	1
Amaranthaceæ,	Amaranthus,	1
Nepenthaceæ,	Nepenthes,	2
Asarinæ,	Thottea grandiflora,	0
Loranthaceæ,	Loranthus retusus,	1
	Total,	6

Polypetalæ.

Euphorbiaceæ,	Excœcaria,	1
	Phyllanthus,	1
	Rottlera,	1
Bixaceæ,	Bixa,	1
Dilleniaceæ,	Tetracera,	1
Sapindaceæ,	Nephelium lappaceum,	1
Meliaceæ,	Aglaia odorata,	1
Rutaceæ,	Evodia triphylla	1
Ternstrœmiaceæ ?	Ixonanthes reticulata,	1
Terebinthaceæ,	Boueia microphylla,	1
Malvaceæ,	Paritium,	1
	Urena,	1
	Sida,	1

		No. of Species
Tiliaceæ, ...	Grewia, ...	1
Dipterocarpeæ, ...	... ...	1
Connaraceæ, ...	Connarus, ...	1
Leguminosæ, Cassieæ,...	Mezoneuron, ...	1
	Bauhinia, ...	4
Papilionaceæ, ...	Crotalaria, ...	1
Rosaceæ, ...	Rubus, ...	1
Memecyleæ, ...	Memecylon, ...	1
	Pternandra, ...	2
Melastomaceæ, ...	... ...	3
Myrtaceæ, ...	Myrtus tomentosa, ...	1
	Eugenia, ...	4
	Melaleuca Leucadendron, ...	1
	Tristania Whitiana,...	1
Lythrarieæ, ...	Lagerstroemia floribunda, ...	1
	Total, ...	37

MONOPETALÆ.

Compositæ, ...	Conyza ?	1
Rubiaceæ, ...	Nauclea, ...	2
	Mussaenda, ...	1
	Ixora, ...	1
	Epithinia malayana, ...	1
Myrsineæ, ...	Ardisia, ...	1
	Baeobotrys, ...	2
Styraceæ, ...	Symplocos, ...	1
Verbenaceæ, ...	Clerodendrum, ...	4
	Callicarpa, ...	1
	Premna, ...	1
	Vitex, ...	1
	Total, ...	17

LANTAO, CANTON.

ACOTYLEDONES.

Algae, ...	... ...	1
Lycopodineæ, ...	Lycopodium cernuum, ...	1

		No. of Species
Filices,	Lygodium,	1
	Gleichenia,	1
	Niphobolus,	1
	Cheilanthes,	2
	Adiantum,	1
	Pteris,	2
	Cyathea?	1
	Total,	11

MONOCOTYLEDONES.

Cyperaceæ,	Cyperus,	1
	Scleria,	1
Gramineæ,	Setaria,	1
	Imperata,	1
	Andropogon,	2
	Anthistiria,	1
	Bambusa,	1
Smilacineæ,	Dianella,	1
Orchideæ,	Spiranthes,	1
	Total,	10

DICOTYLEDONES.

Polypetalæ.

Sterculiaceæ,	Helicteres,	1
Cucurbitaceæ,	Bryonia,	1
Oxalideæ,	Oxalis,	1
Rosaceæ,	Rubus moluccanus,	1
Leguminosæ,	Indigofera?	2
	Lespedeza?	1
Melastomaceæ,	Melastoma malabathricum,	1
	——— sanguineum,	1
Myrtaceæ,	Myrtus tomentosa,	1
	Bæckia frutescens,	1
	Total,	11

Monopetalæ.

Compositæ,	Cirsium?	1
Rubiaceæ,	Nauclea Adina,	1

			No. of Species
Apocyneæ,	...	Strophanthus dichotomus, ...	1
Scrophularineæ,	...	Siphonostegia chinensis, ...	1
Acanthaceæ,	...	Acanthus ilicifolius, ...	1
		Total, ...	5

Among a few *Indeterminatæ* are two species of a radicant herbaceous genus, with opposite fleshy leaves, and rubiaceous stipulæ.

CHUSAN.

ACOTYLEDONES.

Lycopodineæ,	...	Lycopodium, ...	1
Filices, ...	...	Lygodium, ...	1
		Pleopeltis, ...	1
		Aspidium, ...	3
		Pteris, ...	2
		Total, ...	8

MONOCOTYLEDONES.

Cyperaceæ,	...	Cyperus, ...	1
Gramineæ,	...	Panicum stagninum, ...	1
Commelineæ,	...	Commelina, ...	1
Smilacineæ, ...	...	Smilax, ...	1
		Scilloidea* (without leaves,) ...	1
Orchideæ, ...	...	Eulophia?	1
Alismaceæ, ...	...	Sagittaria, ...	1
Hydrocharideæ,	...	Hydrocharis Morsus ranæ ?* ...	1
Lemnaceæ, ...	...	Lemna, ...	1
		Total, ...	9

DICOTYLEDONES.

Incompletæ.

Taxineæ, ...	...	Salisburia,*	1
Coniferæ, ...	...	Juniperus, ...	1
		Pinus,*	1

		No. of Species
Amaranthaceæ,	Achyranthes,	1
Polygoneæ,	Polygonum,*	7
	Rumex,*	2
Elæagneæ,	Elæagnus,	1
Cupuliferæ,	Quercus,*	1
Salicineæ,	Salix babylonica,	1
Urticeæ,	Humulus Lupulus,*	1
	Cannabis sativa,	1
	Morus nigra,	1
	——— alba,	1
	Urticea, (fragments,)	1
	Urtica,	1
	Ficus,	1
	Artocarpea? (fragifera,)	1
	Total,	24

Polypetalæ.

Euphorbiaceæ,	Elæococca verrucosa,*	1
	Stillingia sebifera,	1
	Acalypha,	1
	Phyllanthus,	2
Ranunculaceæ,	Ranunculus aquaticus?	1
	Clematis,*	1
Nelumboneæ,	Nelumbium,	1
Cruciferæ,	Sinapis,	1
Resedaceæ,	Reseda,*	1
Oxalideæ,	Oxalis,	1
Hypericineæ,	Hypericum,*	2
Ternstrœmiaceæ,	Camellia,*	2
Aurantiaceæ,	Citrus,	3
Meliaceæ,	Aglaia,	1
Ampeliddeæ,	Vitis,	2
Celastrineæ,	Elæodendron,	1
Rhamneæ,	Zyziphus,	1
Tamariscineæ,	Tamarix,	1
Sempervivæ,	Sedum,	1
Xanthoxyleæ,	Xanthoxylum,	1

		No. of Species
Sterculiaceæ,	Sterculia,	1
Malvaceæ,	Hibiscus,	1
	Gossypium,	1
Acerineæ,	Acer,*	1
Hamamelideæ,	Hamamelis sinensis,	1
Rosaceæ,	Fragaria,	1
	Agrimonia,*	1
	Rubus,	2
	Rosa,	1
	Amygdalus,	3
	Pyrus,	2
	Cydonia,	1
Leguminosæ,	Papilionaceæ,	6
Melastomaceæ,	Melastoma? sine fl. fr.	1
Granateæ,	Punica Granatum,	1
Myrtaceæ,	Myrtus,	1
Araliaceæ,	Hedera Helix?*	1
Umbelliferæ,	Daucus,	1
	Carum,	1
Cucurbitaceæ,	Cucurbita,	1
	Actinostemma, *(gen. nov.)*	1
Begoniaceæ,	Begonia,	1
	Total,	57

Monopetalæ.

Compositæ,	Cichoracea,	1
	Bidens,	1
	Artemisia,	2
	Eclipta prostrata?	1
	Aster,	1
	Chrysanthemum,	1
	Pulicaria,	1
	Gnaphalium,	1
	Emilia,	1
Rubiaceæ,	Paederia fœtida?*	1
	Gardenia,	1
Caprifoliaceæ,	Sambucus,*	1
Ericineæ,	Rhododendron,* efl. efr.	1
Convolvulaceæ,	Convolvulus,	2

		No. of Species
Solaneæ, ...	Nicotiana Tabacum, ...	1
	Datura fastuosa?	1
	Solanum nigrum, ...	1
	——— Dulcamara,*	1
	Capsicum, ...	1
	Lycium, ...	1
Scrophularineæ, ...	Veronica Anagallis, ...	1
	Bonnaya?	1
Verbenaceæ, ...	Verbena officinalis, ...	1
	Clerodendrum, ...	2
Pedalineæ, ...	Sesamum orientale, ...	1
Labiatæ, ...	Mentha, ...	1
	Rosmarinus officinalis,*	1
	Labiata alia, ...	1
Boragineæ, ...	Symphytum?	1
Oleineæ, ...	Olea fragrans, ...	1
Plumbagineæ, ...	Plumbago,*	1
Plantagineæ, ...	Plantago,*	1
	Total, ...	35

TENGCHOU, (Pekin.)

Geraniaceæ, ...	Erodium, ...	1
Sempervivæ, ...	Sedum, ...	1
Umbelliferæ, ...	... ...	1
Compositæ, ...	Artemisioides, ...	1
Indeterminata eflor:	Statices facie, ...	1
	Total, ...	5

TOKI, (Pekin.)

MONOCOTYLEDONES.

Gramineæ, ...	Poa vel Festuca, ...	2
Smilacinæ, ...	Allium, ...	3
Iridcæ, ...	Pardanthus, ...	1
	Total, ...	6

DICOTYLEDONES.

Polygoneæ, ...	Polygonum Fagopyrum ?	1
Urticeæ, ...	Cannabis sativa, ...	1
Tamariscinæ, ...	Tamarix, ...	1
Silenaceæ, ...	Dianthus, ...	1
Rosaceæ, ...	Potentilla, ...	1
	Agrimonia, ...	1
Leguminosæ, ...	Papilionaceæ, ...	4
Primulaceæ, ...	Lysimachia, ...	1
Asclepiadeæ, ...	Cynanchum sibiricum ?	1
Apocyneæ ?	... ...	1
Convolvulaceæ, ...	Convolvulus, ...	1
	Total, ...	14

The total number of Species in a state admitting of determination is as follows :—

Straits of Malacca, ...	81
Canton, ...	37
Chusan, ...	133
Tengchou, ... } Pekin, ...	25
Toki, ... }	
Total, ...	276

I shall now make such remarks as I am able on the most interesting forms of these collections.

STRAITS' COLLECTION.

Asarinæ.—The specimens of Thottea consist of a flower, part of a raceme, and a full grown leaf. A description and drawing of this plant, first met with by König in 1779, is now in the possession of the Linnean Society.

Ternstrœmiaceæ ?—I refer with some doubt to this family Ixonanthes of Jack. This genus, hitherto only known from Jack's description, has been placed doubtfully among Cedrelaceæ by Dr. Lindley and M. Endlicher; with which however its resemblances

appear to be rather technical. A more proper place is, I think, to be found between Ternstrœmiaceæ and Hypericineæ, the major part of the affinities being with the former family.

Ixonanthes.—*Jack. Mal. Misc.* (*Calc. Journ. Nat. Hist.* 4. *p.* 115.)

Char. Gen.—*Calyx* 5-6-partitus. *Corolla* 5-6-petala, glutinosa, convoluto-clausa. *Stamina* 10-20; filamentis capillaceis; antheris ovatis, bilocularibus. *Annulus* (crenulatus) inter stamina et pistillum. *Ovarium* 5-loculare, loculis biovulatis. *Ovula* pendula ex apice anguli interioris. *Stylus* capillaceus. *Stigma* discoideum. *Fructus* septicidim 5-valvis. *Semina* cum vel absque ala, sæpe sterilia et difformia. *Albumen* carnosum. *Embryo* lateralis. *Radicula* supera.

Habitus.—Arbores *malayanæ* Folia *alterna, exstipulata? venatione reticulata.* Corymbi cymæve *axillares.* Flores *parvi, inconspicui.*

I. reticulata, foliis obovatis vel elliptico-obovatis integris, corymbis folia subæquantibus, staminibus 10, seminibus apice alatis.

I. reticulata. *Jack. Mal. Misc. (Calc. Journ. Nat. Hist. l. c.)*

Hab.—Singapore, *Rev. Mr. White.*

Descr.*—*Rami* angulati, flexuosi. *Folia* obovata, vel majora elliptico-obovata, obtusissima, late emarginata coriacea; venæ secundariæ arcuatim nexæ, interveniæ reticulatæ. *Pedunculi* axillares, solitarii, folia subæquantia vel excedentia, dichotomi. *Pedicelli* plerumque ternati, *Flores* cujusve cymæ sub-7, materie resinosa glutinosa aspersa, parvi. *Sepala* ovato-oblonga vel rotundata. *Petala* paullo majora, convoluta, apice quasi perforata. *Stamina* 10, in annulo glanduloso crenulato ovarii basin arcte cingente inserta. *Filamenta* capillacea, petalis 4 plo longiora, per os angustum corollæ longe exserta. *Antheræ* oblongæ, basi affixæ; connectivo lato; loculis angustis. *Ovarium* globoso-conicum. *Stylus* capillaceus, filamentis longior. *Stigma* discoideum.

I. dodecandra, (u. sp. ?) foliis obovata-lanceolatis crenato-serratis, corymbis folia superantibus, staminibus 13-16, seminibus perfectis paucis hilo processigeris, sterilibus difformibus processubus hili saepius tricruribus.

* From a single specimen in flower.

Habit.—Woods about Pringitt, and near Rhim, Malacca.

Descr.*—*Arbor* majuscula. *Folia* alterna, exstipulata, breve petiolata, obovato-lanceolata, obtusa, emarginata, coriacea, crenato-serrata (sæpius distanter,) subtus reticulata, sicca castaneo-brunea: magnitudine varia, majora nempe 6-uncias longa, 2-lata, minora long. 3-uncialia, lat. 1-uncialia. *Corymbi* axillares, folia excedentes, multiflori, *e cymis* dichotomis sub-6-floris conflati. *Bracteæ* caducæ. *Flores* parvi, inconspicui, viridescentes, glutinosi. *Calyx* ultra medium 5 partitus, (potius 5-sepalus, pedicellis apice incrassatis); laciniæ corollam fere æquantes, oblongæ, acutæ. *Corolla* convoluto-clausa, apice quasi perforata. *Petala* rotundato-oblonga, concava, venosa. *Annulus* brevis, carnosus, crenulatus, inter stamina et pistillum. *Stamina* 13-16. *Filamenta* annulo basin versus inserta, capillacea, diu persistentia. *Antheræ* ovatæ, biloculares, longitudinaliter dehiscentes, deciduæ. *Pollen* tri-porosum. *Ovarium* conicum, sub-5-gonum, 5-loculare. *Ovula* 2 cuivis loculo, anatropa, pendula ex apice anguli interioris ope funiculorum longiusculorum. *Raphe* extrorsa. *Stylus* capillaceus, ovario 6-plo longior, stamina paullo superans, diu persistens. *Stigma* capitatum, margine reflexum. *Fructus* anguste ovatus, acutus, 7-8. lineas longus, 3-4-latus, basi calyce et corolla circumdatus, lineis 5 notatus, septicidim 5-valvis, valvis osseis intus centro carinatis. *Semina* sæpius abortientia, processu foraminis sursum et deorsum longe producto, infero sæpius bicruri; *perfectum* brunneum, oblongo-lanceolatum, compressiusculum, processu foraminis sub 3-auriculato. *Tegumentum* exterius coriaceum: interius tenuissimum, albumen arcte vestiens. *Raphe* semi-completa. *Chalaza* subdepressa. *Albumen* carnosum, copiosum. *Embryo* ad latus exterius albuminis. *Radicula* longa, gracilis, longitudine cotyledonum foliacearum. *Plumula* inconspicua.

This species appears to be allied to T. icosandra, Jack, from which it chiefly seems to differ in the number of the stamina.

Anacardieæ.—Compilers appear to have overlooked Buchanan's† remarks on the opposite leaved mangoes, the original species only

* Chiefly from dried specimens; of the seeds from living ones.

† Mem. Wern. Soc. 5, p. 326.

being referred to by Steudel* and Endlicher.† Yet besides the two species founded by Buchanan (loc. cit), I believe without sufficient grounds, on the Manga sylvestris prima et altera of Rumph,‡ Buchanan's description of the Burmese Mariam is so different from that of Roxburgh, as to lead to the suspicion, that under the name Mangifera oppositifolia, two species will be found.

Up to this time, I have met with three species, of which the following are the distinguishing marks, independently of differences that may exist in their hermaphrodite flowers and fruit.

Boueia,§ Meisner.‖ *Cambessedea*, Wight and Arnott.¶

B. burmannica, foliis oblongo-lanceolatis, paniculis laxifloris foliis brevioribus parce puberulis, petalis sæpissime 4 lineari-oblongis calycem subduplo excedentibus.

Mangifera oppositifolia.* *Roxb. Hort. Bengh. p.* 18. *Fl. Indic.* 1. *p.* 640. *ed. Carey.*

Manga sylvestris, *Rumph. Hb. Amb.* 1, *t.* 27?

* Nomenclat. Bot. ed: 2*da.*

† Gen. Pl. p. 1133, No. 5918.

‡ Rumph. under the head Manga sylvestris, does not mention the opposition of the leaves, and though his figure, t. 27, might pass for Mangifera oppositifolia, yet the leaves are by no means represented as being generally opposite, and the aspect of the flowers again is rather that of a genuine Mango.

§ This genus was first proposed, and its differences from Mangifera given, by Messrs. Wight and Arnott under the name Cambessedea, for which, from its being pre-occupied, Meisner has substituted Boueia. But no sign or mark is appended to indicate who were the original proposers of the genus, with whom the merit must in most cases necessarily rest. It is one thing to glance over a complete Catalogue of names, and ascertain which is pre-occupied, another to detect and define a new group. Botanists have admitted certain conventional signs, which have been generally adopted, and would do well to admit signs of a most conspicuous character by which the compiler may be known from the designer; the Botanist who names after examination and comparison, from him who names without having done either. Or as suggested in the excellent rules for reforming Zoologic Nomenclature, p. 8, para. 4, now that communication is so rapid, it might be courteously left to the framer of the genus to correct the error.

‖ Endl. Gen. Pl. l. cit.

¶ Prod. Fl. Pen. Ind. Or. p. 170, *in annot.*

* The opposition of the leaves being characteristic of the genus, it becomes necessary to change Roxburgh's name.

Habit.—Commonly cultivated by the Burmese, by whom it is called *Mariam*, or *Mai-een*.

Arbor parva, ramulis compressis angulatis. *Folia* anguste oblongo-lanceolata, obtuse acuminata vel cuspidata, coriacea, longitudine 5-uncialia, latitudine $1\frac{1}{2}$-uncialia. *Stamina* sæpissime 4. *Drupa* magnitudine ovi gallinulæ.

Buchanan describes the inflorescence of his plant as "spica simplicissima foliis multo longior," and the fruit as, "drupa figura et sapore Mangiferæ indicæ." But he appears only to have been acquainted with Roxburgh's plant through the Hortus Benghalensis, a catalogue containing no characters or discriminative marks.

B. macrophylla, (n. sp.) foliis oblongo-lanceolatis, paniculis amplis thyrsoideis pubescentibus foliis brevioribus, petalis sæpissime 3 calyce subtriplo longioribus.

Habit.—Malacca. *Roomaniya Baitool* of the Malays.

Arbor magna, corona densa. *Ramuli* tetragoni. *Folia* valde coriacea, obtuse et brevi cuspidata, long. 6. 8-uncialia, latit. $2\text{-}2\frac{1}{2}$ uncialia. *Panicula* dense thyrsoidea. *Stamina* sæpissime 3.

B. microphylla, (n. sp.) foliis lanceolatis, paniculis parvis thyrsoideis foliis brevioribus, petalis 4 oblongo-rotundatis calyce duplo longioribus.

Habit.—Malacca. *Roomaniya Paigo* of the Malays.

Arbor, ramulis compressis. *Folia* longe et obtuse cuspidata, valde coriacea, longit. $2\text{-}3\frac{1}{2}$ uncialia, latit. $1\text{-}1\frac{1}{2}$ uncialia. *Paniculæ* parvæ, foliis aliquoties breviores. *Flores* minus elongati, minuti. *Drupa* magnitudine ovi gallinulæ.

The habit of these two species is different from that of the Burmese one, the leaves more coriaceous, and the secondary veins, more distinct.

The fruit of both is eaten by the Malays. They have the characteristic acidity, but make excellent pickles.

The genus presents a remarkable analogy with Oleinæ.

Memecyleæ.—Pternandra, Jack, (*Ewyckia*, Blume), though referred by Dr. Lindley to Melastomaceæ, appears to me to belong to Memecyleæ. The genus is remarkable for its placentation, which is the only instance I am acquainted with of the co-existence of thoroughly parietal placentation with perfect dissepiments, inde-

pendently of any apparent production inwards of any parts of the placental surface. Hypothetically this is explainable by assuming the ovula to be confined to that part of the carpellary leaf with which almost invariably they have no manner of connection. In other words, they may be declared to arise from the back of the carpel leaf, or from the midrib, and the space on either side between it and the inflected margins.*

Appearances, derived from the examination of Pternandra cœrulescens, are not perhaps altogether unfavourable to the supposition, that there is a disturbance in the direction of the carpel leaves analogous to that which affects some, perhaps most Borragineæ, by which the true apex of each carpellum is brought close to the base, and in which, as appears to me suggested by the situation of the raphe, the placenta has a disposition to be dorsal; so that if a polysporous placenta be found to exist in a carpellum so constituted, it may, I am inclined to conjecture, be as dorsal as it is in Pternandra.

From the evidence afforded by this genus, it would appear, that an "ovarium inferum" may have part of its cavities, or even of its placentæ actually *superior;* that is, above the line drawn when the term "ovarium inferum" is made use of; which term, nevertheless, is perhaps quite as admissible in many instances as that of ovarium adhærens.

Myrtaceæ.—I refer without doubt to Tristania, one of Mr. White's Plants. It is the fourth Indian species of the genus I have met with, the northerly limit of which, so far as yet known, appears to be Moulmein, 17° N. L. This is a fact of some interest, as Mr. Bennett† states, that he is only acquainted with one species found beyond the limits of N. Holland. In connection with this I may mention Stylidium, which is perhaps the last Australian form

* Most of the instances hitherto cited as exhibiting dorsal placentation, appear to me to be untenable, and naturally explicable. But it is certain that Monocotyledonous monstrosities do occur, in which the buds arise from the inner surface of the leaves to the exclusion of the usually gemmiferous margins. Of this I met with a marked instance in a Liliaceous plant in Eastern Affghanisthan.

† Pl. Jav. Rar. Pt. II, p. 128.

that disappears, an instance of the genus having been found by Dr. Voigt about Serampore, and by Lieut. Kittoe at Midnapore. This genus also occurs at Mergui and Moulmein, but has not hitherto been remarked on the Khassya Hills or in Assam. Another Australian form, Melaleuca Leucadendron, forms from its abundance in the low littoral tracts of Malacca a very marked feature of vegetation. The northerly limit of this species is Mergui, (12° N. L.), where it occurs in similar localities, but comparatively limited in size and numerical extent.

Three of the four species above alluded to, may be thus distinguished:—

Tristania *burmannica*, ramulis glabris, foliis alternis obovato-lanceolatis glaberrimis, calyce extus pubescente intus cum ovario dense albo-tomentoso, staminum phalangis 4-6-andris.

Habit.—Hills about Moulmein. No. 76, of a small Burmese Collection sent to Eugland in 1834.

Arbusculum. *Ramuli* et *inflorescentia* griseo-puberuli. *Folia* longitudine 4-uncialia, latitudine 1-1¼-uncialia *Pedunculi* compressi. *Cymæ* confertifloræ, foliis duplo breviores, pedicelli plerumque terni. *Florum* odor pessimus. *Petala* integra, cum filamentis parce puberula.

T. merguensis, ramulis subglabris, foliis alternis spathulato-lanceolatis basi biauriculatis, calyce et ovario puberulis, staminum phalangibus 6-10 andris, capsula semisupera.

Habit.—Sea-shore of the Island Madamacan, opposite Mergui, in flower in August. No. 235, Herb. Mergui.

Arbor ramis pendentibus, *Folia* alterna vel subopposita, subsessilia, longitudine 7-7½ uncialia, latitudíne 2-2¼-uncialia. *Pedunculi* ancipites, foliis subduplo breviores; pedicelli minute puberuli. *Florum* odor pessimus, stercoraceus. *Petala* alba, denticulata. *Phalanges* petala excedentes. *Capsula* ⅔ supera, semi-inclusa, loculicidim et septifragim trivalvis, valvis extus transverse rugosulis. *Semina* arcte collateralia, plura paleacea abortiva, pauciora apice alata, fertilia. *Cotyledones* contortuplicatæ.

T. Whitiana, foliis alternis spathulato-obovatis parce puberulis, ramulis calyceque extus puberulis, calyce intus et ovario tomentoso-puberulis, staminum phalangibus 2-4 andris.

Habit.—Singapore. Malayan name *Plowan*. Rev. Mr. White.

Folia, in apice ramorum conferta, obtuse cuspidata, longitudine 4-4½, latitudine 1½-1¾ uncialia; *venæ* secundariæ magis approximatæ et parallelæ. *Corymbi* folia excedentes, puberuli. *Petala* undulata.

Of these T. burmannia is closely allied to P. obovata Bennett in Horsf. Pl. Jav. Rar. p. 127. t. 27.

The fourth species was met with sparingly in fruit on Mount Ophir; in the form of its leaves it approaches to T. obovata, but the fruit is rounder. The peduncles appear much less branched than in any of the other extra-Australian species, but the degree of adhesion between the calyx and pericarpium is the same. It was observed with Bæckea frutescens, three species of Leptospermum, and one of Leucopogon.*

I know so little of the Australian species of this genus and family that I am unable to state what value should be attached to the placentation in these four extra-Australian species, to the abortion and deformity of most of the seeds, the wing of the fertile one, and the embryo. The habit and especially geographic distribution would seem to point to some degree of separation. It is to be remembered, however, that Mr. Bennett in the Pl. Jav. Rar., a work of the highest authority, does not remark on any structural peculiarity presented by Tristania obovata, his specimens of which, excepting the absence of ripe seeds, appear to have been complete.

Rubiaceæ.—I notice Epithinia mayana, to confirm Messrs. Wight and Arnott's statement, that it has stipulæ. The opposite statement, in the Malayan Miscellanies, I have ascertained was corrected† by Dr. Jack himself in a copy found thrown aside among some

* The Mount Ophir species of this genus, which is not uncommon at Paddam Bhattoo, differs from that found on the littoral tracts of Malacca in the narrow leaves crowded on short branches, the corolla scarcely partite to the middle, the large hypogynous scales which nearly enclose the ovarium, and the smooth filiform style. For this the name L. ophirensis may be proposed.

Indeed it was improbable that an exclusively littoral plant should make its appearance suddenly on an isolated Mountain at an elevation of 2000 feet any where: much more so on Mount Ophir, the productions of which from Paddam Bhattoo upwards are very dissimilar from general Malacca vegetation, approaching much more to that characteristic of Polynesia and Australia?

† Instead of "Stipules none," it is, "stipules short, interpetiolar."

loose papers in the Botanic Gardens. There are at the Botanic Gardens some other MS. corrections which might have been advantageously inserted in the reprint of his writings, undertaken by Sir W. Hooker at the suggestion, I believe, of Dr. Wallich.*

The disposition of the placentæ and ovula in this genus is curious. The former, or perhaps rather their ovuliferous portions, are confined to the middle of the inner angle of each cell, from which they are produced outwards into the middle. Each bears on its apex two ovula, the upper one of which is erect, the under pendulous; the raphe of both being on that side of the ovulum next the outer wall of the cell. The result, when both ovula are matured, is, that two anatropous seeds of which one is erect and one pendulous, have the radicles of their embryos pointing exactly towards one another.

CANTON COLLECTION.

This is entirely tropical, and the only peculiar forms that appear to me to exist in it are Nauclea Adina, Strophanthus dichotomus, and Siphonostegia sinensis. For Bæckia frutescens is found on Mount Ophir, with some other Australasian or Polynesian forms, and Myrtus tomentosa is to be found in abundance in the Straits of Malacca. But Siphonostegia, the specimens of which present additional calycine lobes, is the only local or characteristic form, for Nauclea is not only a common Indian genus, but there is, I believe, a Khasiya form that approaches N. Adina itself, and Strophanthus exists on the N. E. frontier of Bengal, and about Malacca, where it is represented by a very fine species with large horn-like follicles. All the remaining genera, and probably almost all the species, may be met with either on the Tenasserim Coast or on the Eastern frontier of Bengal.

CHUSAN COLLECTION.

The list of this collection given at the commencement is not limited to plants actually existing in the collection, but includes a few others, either contained in Dr. Cantor's sketches, or in his conspectus of his collections.† I have attached an asterisk to those

* Are there any other MSS. of Jack in existence? I find references in Dr. Wallich's hand-writing to a MS. description of Hoya grandiflora, in an imperfect copy of Carey's edition of Roxburgh's Flora Indica.

† Calc. Journ. Nat. Hist. No. V.

forms which seem to me to be extra-tropical, from which it would appear that the great bulk (about 5-6th) is decidedly tropical.

This collection presents an unusual mixture of form, much of which is perhaps attributable to the effects of cultivation. Almost all the genera are to be met with in "India Orientalis," but I imagine scarcely any other like locality could present such a mixture as that of Commelina, Hydrocharis, Salisburia, Achyranthes, Pinus, Aglaia, Humulus Lupulus, Pæderia, Juglans, Zingiber, Agrimonia, Nelumbium, Rhododendron and a Palm.

The most marked northern forms appear to me to be Hydrocharis, Salisburia, Pinus, Quercus, Humulus Lupulus, Agrimonia, Rhododendron, Solanum Dulcamara?

Clematis, Rumex, Camellia, Hedera, Sambucus and Plantago all admit of some degree of explanation, in as much as these genera may be found at similar levels, but in considerably lower latitudes, in certain parts of the Eastern frontier of Bengal; and some species of Juniperus under cultivation seem to defy a great amount of heat.

Other similarities to the Flora of our Eastern frontier, Assam for instance, are indicated by the affinity of the Quercus to one from the Khasiya Hills, on which it is, so far as I know, the only European form of that genus; by one of the Polygoneæ which also occurs in the same direction, and which is remarkable for its armed habit, perfoliate leaves, and bright azure berries, and by the genus Actinostemma.

The only parts of this collection which I feel myself at all competent to illustrate, are Hamamelideae and Cucurbitaceæ.

Hamamelideæ.—The species is Hamamelis sinensis, R. Br.; the specimens are in fruit, and look at first sight not unlike some Grewias.

The Asiatic plants of this family are Bucklandia populnea, two species of Hamamelis, one of Fothergilla? found by Dr. Falconer, and I believe M. Jacquemont, in Cashmir, and one of Corylopsis.*

Corylopsis.

* *Zuccar. in Sieb. Fl. Japon. fasc.* 1. *p.* 45. *t.* 19. 20. *Endl. Gen. Plant. p.* 804. *No.* 4589.

Char. Gen.—*Calyx* semi-inferus, 4-5 dentatus vel partitus. *Petala* 4-5, spathulata vel obovata. *Stamina fertilia* 5, sepalis opposita; antherarum loculi secus

Sedgwickia, which I some time ago, from examination of fruit-bearing specimens, referred to Hamamelideæ, turns out to be a

centrum longitudinaliter dehiscentes, valvis extrorsum flexis persistentibus; *sterilia* 5, vel plura (sub-15) irregularia. *Ovarium* semi-inferum. Ovula solitaria. *Semina* ex-alata.

Habitus.—Frutices *Japanicæ et Himalayanæ, habitu Coryli.* Gemmarum squamæ *imbricatæ.* Stipulæ *scariosæ, caducæ, gemmarum squamas extimas formantes.* Folia *cordata, mucronato-serrata, pennivenia.* Spicæ *preciæ, terminales et axillares, basi squamis gemmarum involucrantibus, interdum subpetaloideis stipatæ, pendulæ, sericeopilosæ; fructus induratæ.*

Obs.—Hamamelis, genus propinquum, differt habitu, et petalis elongatis æstivatione spiraliter involutis.

C. *himalayana*, (n. sp.) spicis multifloris, calyce cyathiformi 5-dentato villoso, petalis obovatis quam genitalia longioribus, staminibus fertilibus subinæqualibus pistillo longioribus, sterilibus sub-15, 10 majoribus ante petala, 5 minoribus ante stamina.

Var. ? A.—Folia subtus ad venas tantum piloso-tomentosa.

Habit.—Bootan mountains; banks of the river and sides of woods at Tassangsee, alt. 5387 feet; on broken ground about Tongsa, alt. 6527 feet; and near Pangee Minzee Peeza, alt. 7500 feet.

Var. ? B.—Folia subtus tomentoso-pilosa.

Habit.—Khasiya Hills; Moflung, alt. 5500 feet, on the broken rocky ground covered with bushes, between the bungalow and the river.

Descr.—*Frutex* arbusculoideus, 6-8 pedalis. *Ramuli* flexuosi, brunneo-rubri. *Gemmæ* floriferæ alternæ, ex axillis foliorum lapsorum, demum pendulæ, superiores præcociores; *squamæ* plures, imbricatæ, ovatæ, scariosæ, extimæ brunnescentes intus sericeæ, intimæ lutescentes utrinque sericeæ, in bracteas sericeo-hirsutas sensim minorifactæ. *Folia* alterna; *petioli* sub-semunciales, albido-pubescentes; *lamina* cordato-roundata, breviter cuspidata, mucronato-serrata, coriacea, subtus pubescens, basi sub 9-venia, junior plicata secus venas; venæ secondariæ marginem versus oblique cerrentes, inferiores latere exteriori 3-5-ties ramosæ, intermediæ dichotomæ versus apicem, summæ simplices; intervenia venulis transversis et anastomosantibus reticulatæ. *Spicæ* pendulæ, longit, 1-1½-unciales, multifloræ, sericeo-hirsutæ, *Flores* majusculi, lutei, suaviter odori, hermaphroditti.

Calyx breve obconicus 4-5 fidus, laciniis ovatis submembranceis. *Petala* 5, perigyna, lacinis calycinis alterna, lutea, obovata, breve unguiculata, irregularia, majoribus patentibus conduplicato-plicatis, margine involutis; æstivatio aperta.

Stamina fertilia 4-5, sepalis opposita, fauci calycis inserta; *filamenta* robusta, breviuscula, fere cylindrica; *antheræ* biloculares, longitudinaliter dehiscentes, valvis coriaceis, extrorsum flexis, dorso mutuo applicitis, persistentibus, *Pollen* globosum, plicis 3 medio 1-porosis. *Stamina* sterilia plura, irregularia, subbi-

species of Liquidambar,* (*Altingia* of Noronha), on which genus Blume constructed his family Balsamifluæ. For this oversight and empty compliment, Dr. Wallich is responsible, as he had Blume's Flora Javæ (in which folio work, the family is defined and the genus figured,) before him during the printing of my MSS.

The family Balsamifluæ (Balsamaceæ, Lindl.) appears to be generally considered allied to Plataneæ, Salicineæ, and some of their neighbours. And although the structure of Bucklandia was not detailed before 1836, it still appears to me odd, that no indication of the similarity of Liquidambar with Fothergilla had been noticed.

From the great variety in structure presented by Hamamelideæ, in which family, limited as it is in genera and species, plants occur varying in habit, with hermaphrodite or polygamous flowers, with petals or without petals, with a quaternary or quinary number of parts, with definite or indefinite stamina, with simple or valvular dehiscence of anthers, I am inclined to believe that Balsamifluæ will be found to be a temporary, or at least a subordinate group. Its present claims to distinction seem to me limited to the male inflorescence and flowers, which are, so far as I can judge from dried

seriata; extoriora sæpius dentiformia, interdum subulata, filamentorum basibus sæpius opposita; interiora sæpissime per paria petalis opposita, majora, atroviridia, apicibus subglanduliformibus sæpe recurvis. *Ovarium* semi-inferum, sericeo-pilosum, biloculare. *Styli* 2, subulati, staminibus subduplo breviores, apicibus recurvis subdilatatis intus stigmatosis. *Ovula* inloculis solitaria, pendula, anatropa; *tegumenta* bina; *foramen* magnum, extus spectans.

Spicæ fructus pendulæ, induratæ, bracteis orbatæ. *Capsulæ* scriebus circiter 4 spiraliter dispositæ, (dimidium inferius calyce tubo indurato corticatum,) biloculares, bivalves, valvis demum septicidim bipartitis, stylisque semi-partis recurvis apiculatis; *endocarpium* atrum. *Semina* non visa.

My specimens of the Khasiya plant are in fruit. I have not therefore been able to compare the flowers. The leaves vary much in size, those on the mere leaf-bearing branches being as large as those of the Minza Peeza specimens. These again differ from the other Bootan ones in the spikes being less *precious*, in the length of the styles, and in the longer and pale ferruginous hairyness of the spikes.

This is the fourth species of this genus, two having been defined, and one indicated in the Flora Japonica, (loc. cit.) of the three Japanese species only one, C. Cesakii. Zucc. has been hitherto met with in the wild state.

* Fl. Jav. p. l. t. l. 2.

specimens of the Assam species, deficient in any envelope analogous to a perianth or even partial bracte. Its habit presents nothing peculiar; it is not more characteristic of the "Amental" order than that of Fothergilla or Corylopsis. Its anthers present no very great peculiarity, particularly if compared with those of Fothergilla, while its female flowers are in many essential points closely allied to those of Bucklandia, in which, and I take this to be of considerable importance, female capitula also occur, and the ovula are considerably increased in number.

The affinities of Hamamelideæ appear to be sufficiently complex, the first step to the simplification, the determination of the true nature of the female perianthium not being settled.* In addition to those already indicated, a relationship with certain Laurineæ may be suggested.

Cucurbitaceæ, *Zanoninæ*.—Of the two plants of this family among the Chusan Plants, one belongs to a genus hitherto, I believe, undescribed.

ACTINOSTEMMA.

Char. Gen.—*Flores* monoici; *masc.* rotati. *Sepala* 5, acuminata. *Petala* 5, acuminatissima. *Stamina* 5, soluta, antheris uniloculari-bus. *Fœm; Sepala* et *petala* maris. *Ovarium* 1-loculare; *ovula* 2-4, parietalia apicem versus loculi. *Stylus* 1. *Stigmata* 2, reniformia. *Capsula* echinata, semisupera, annulata, ad annulum demum circumscissa. *Semina* pendula, margine exarata.

Habitus.—Herba *scandens, tenera.* Folia *subhastata, dentata.* Cirrhi *laterales.* Flores *inconspicui, viridescentes masculi paniculati, fœminei racemosi, pedicellis medium supra articulatis. Circumscissio* capsulæ *per annulum cicatricis perianthii.*

A. *tenerum.*

Habit.—In hedges, Sadiya, Upper Assam, also on the Khasiya Hills.—Chusan, *Dr. Cantor.*

* I have not been able to ascertain from dried specimens the nature of the envelope of the pistillum of Liquidambar. Judging from the Assam specimens, and the resemblance to the same part of Bucklandia, it is fairly assumable to be calyx. Blume, however, who has described and figured the genus in detail, represents the envelope as derived from scales, united among each other.

Descr.—*Planta* scandeus, herbacea. *Caules* angulati, sulcati, parce puberuli. *Folia* longiuscule petiolata, juniora cordato-hastata, matura fere hastata, acuminata, grosse dentata, dentibus mucrone termiuatis, (basilaribus 1 vel 2 glanduliferis,) subtus ad venas puberula. *Cirrhi* sæpe apice dichotomi. *Inflorescentia* axillaris, puberula. *Paniculæ* masculæ foliis sæpius longiores. *Bracteæ* minutæ, subulatæ. *Flores* caduci, inodori, evolutione centrifugi. *Calyx* profunde 5-partitus, laciniis liueari-lanceolatis, acumiuatis, extus puberulis, basi obsolete saccatis. *Petala* alternantia, fuudo calycis inserta, breviter unguiculata, e basi lanceolata acuminatissima, univenia, æstivatione subimbricata, margine, uti sepala, glanduloso-denticulata. *Stamina* imo fundo calycis inserta, sepalis opposita, omnino soluta; *filamenta* filiformia, breviuscula; *antheræ* extrorsæ, sub-ovatæ, uniloculares, longitudinaliter dehiscentes, *connectivo* glanduloso-papilloso. *Pollen* lanceolatum, tri-plicatum, immersum globosum, granulosum. Rudimentum *Pistilli* nullum.

Racemi fæminei pauciflori, flore unico sæpius tantum evoluto. *Pedicelli* prope florem articulati. *Calycis tubus* subglobosus, verrucosus. *Stamina* castrata vel deficientia. *Ovarium* ⅔ inferum, (parte libera conica verrucosula,) 1-loculare; *placentæ* punctiformes, parietales apicem loculi versus. *Ovula* 2-4, sæpius 4, 2 nempe utroque latere, pendula, anatropa; *tegumenta* bina distincta. *Stylus* brevis, crassus, parce puberulus. *Stigmata* hippocrepiformia. *Fructus* siccus, pendulus, (pedicello petiolo breviore, infra articulum gracili, supra incrassato,) ovatus, apice stigmatis reliquiis notatus, medium versus annulo exsculptus, aculeis viridibus præsertim infra aunulum echinatus, apice subglaber, tactu lævi ad annulum circumscissus. *Semina** 2, vel sæpius 4, pendula, atro-bruunea, tactu saponacea, compressa, superficie rugosa, margine profunde exarata et varie denticulata. *Embryonis cotyledones* ovales, carnosæ; *radicula*, supera, breviuscula, conica; *plumula* conspicua.

This plant has to a considerable degree the habit of Feuillea tamnifolia, Humb. et. Kunth. Nov. Gen. et Sp. p. 175. t 140, which appears to be a plant sui geueris; it also appears to have considerable affinities with Sicyos, with which it agrees in habit.

* The seeds in the Chusan specimen are plano-convex, and scarcely grooved along the edges.

I am, besides this plant, in possession of the two undermentioned genera of the same sub-family.*

* Gomphogyne.—*Flores* monoici ? ; *masc.* rotati. *Sepala* 5. *Petala* 5, lanceolata. *Stamina* 5, soluta, antheris unilocularibus. *Faem* (tubus clavatus.) *Petala* acuminatissima. *Ovarium* inferium, 1-loculare ; *ovula* 3, pendula ex apice loculi. *Fructus* capsularis, apice truncato dehiscens. *Semina* 2, rugosa, margine incrassato.

Habitus.—Herba *scandens, carnosa, habitu Cissi, foliis pedatis.* Fl. masculi *longe paniculati*, fæminei *racemosi, racemis paucifloris nutantibus.* Petala *fl. masculi denticulato-fimbriata, pagina papillosa.* Filamenta *ima basi coalita.* Pedicelli *florum fœmineorum articulati.* Perianthium *reflexum.* Fructus *venosus, interveniis reticulatis.* Semina *utrinque rapheos completæ rugoso-marginata.*

Obs.—Genus affine Zanoniæ situ stylorum, forma et dehiscentia capsulæ ; Actinostemmati calyce pentasepalo, petalis fæminei floris acuminatis, et ovarii unilocularis placentis punctiformibus.

G. *cissiformis*.

Habit.—Budrinath, Himalayan Range. *Mr. Edgeworth.*

Descr.—" Scandens, glaberrima. *Folia* longe petiolata, pedata, foliolis septenis, lanceolatis, inciso-serratis, dentibus mucronulatis. *Cirrhi* oppositifolii, sæpius simplices. *Fl.* ♂. racemosi, in apice ramorum sæpius defoliatorum sicut paniculam longissimam formantes, breviter pedicellati, pentameri. *Sepala* et *petala* pubescentia, viridescentia. *Stamina* 5, libera. *Fl.* ♀ fasciculati, longe pedunculati. *Calycis* laciniæ 5, subulatæ persistentes. *Petala* 5, ovata, acuta. *Styli* 3, apice bifidi. *Fructus* subtrigono-campaniformis, apice truncatus et planus, cornutus stylis persistentibus, apice dehiscens, 1-locularis, ex abortu seminis unius dispermus. *Semina* crassa, oblonga, nigra, margine intrassato rugosa, amarissima." Edgeworth MSS.

Enkylia.—*Flores* dioici ? ; *masc.* rotati. *Sepala* 5. *Petala* 5, acuminatissima, æstivatione involuta. *(a) Stamina* 5 ; filamentis complete monadelphis, *antheris* unilocularibus. *Fœm. Perianthium* maris. *Ovarium* inferum, bi-triloculare ; *ovula* in loculis solitaria. *Style* 2-3, basi coaliti, apice bifidi. *Fructus* globosus, medium supra annulatus, trilocularis. *Semina* solitaria, verrucosa-muriculata.

Habitus.—Herbæ *scandentes habitu Cissi, pilis articulati mollibus pilosæ.*—Cirrhi *lateralis.* Folia *pedata, foliolis quinis, mucronato-crenatis serralisve.* Flores *paniculati, minuti* Baccæ *pisiformes.*

Obs.—Genus Actinostemmati affinis, discrepans habitu, filamentis monadelphis, forma stigmatum, et structura fructus. An Cyclantheræ affinis ?

1. *E. digyna*, foliolis subtus glabris, paniculis molliter et parce pubescentibus, petalis fl. fæm. oblongo-lanceolatis acuminatis, stylis 2 basi coalitis, fructibus pubescentibus.

(a) This æstivation it is proper to remark, occurs in, at least, one genuine Cucurbitacea, see Trichosanthes tuberosa, Bot. Mag. t. 2703.

The prominent points of the major part of this sub-family (Zanoninæ), seem to me the membranous, scarcely marcescent, often

Habit.—Kbalamkhet, Jingsha, at the foot of the Mishmee Hills; and towards Deelong, on the Mishmee Hills, alt. 2-3000 feet.

Descr.—*Herba* tenera, scandens, molliter pubescens. *Petioli* subunciales. *Foliola* subtus glaucescentia, lanceolata, acuminata, crenato-serrata vel dentata cum mucrone, supra ad venas parce puberula, subtus glabra. *Cirrhi* laterales. *Paniculæ* flor. masculorum spithameæ, molliter pubescentes, ramis ascendenti-patentibns. *Bracteæ* subulate. *Flores* racemoso-fasciculati minutissimi; pedicellis subtns florem articulatis. *Parianthium* rotatum. *Sepala* parce pilosa. *Petala* linearilanceolata, subulato-acuminata. *Columna* staminum brevis, vix exserta. *Antheræ* subreniformes, longitudinaliter dehiscentes. *Paniculæ* fl. fæm. breviores. *Pedicelli* calycesque pubescentes. *Petala* oblongo-lanceolata, acuminata, undulata. *Stamina* 0. *Ovarium* superum, bilocul re, pubescens; *ovula* solitaria, pendula, raphe extrorsa ?. *Styli* 2, basi coaliti, bifidi. *Stigmata* simplicia. *Fructus* (immaturus) pubescens.

2. *E. trigyna*, foliolis utrinque pubescentibus, paniculis (fructus) dense pubescenti-hirtis, petalis (fl. fæm.) e basi lanceolata subulato-acuminatissimis, stylis 3 basi discretis, fructibus glabris.

Zanonia cissoides, wall ?

Habit.—Below Dewangiri, towards Dairang, Bootan Mountains, alt. 1-500 feet. In very shady moist woods, Myrung, Khasiya Hills, alt. 5000 feet.

Descr.—Habitus præcedentis. *Caules* et *petioli* dense pubescenti-birti. *Foliola* lanceolata, ecuminata, crenato-serrata, supra parce pubescentia, subtus ad venas densius. *Cirrhi* laterales. *Paniculæ* fructus digitum vix excedentes, denae pubescenti-hirtæ, ramis patentibus. *Pedicelli* subtus flores articulati, dense pubescenti-hirti. *Ovarium* glabrum. *Styli* 3, subulati, bifidi. *Stigmata* simplicia. *Baccæ* pisi forma et magnitudine, apice stylorum reliquiis distantibus notatæ, medium supra annulatæ, atræ triloculares; *epicarpium* subchartaceum. *Semina* solitaria, cuneata, brunnea, muriculata, margine exarata. *Embryo* conformis, plumula conspicua.

Obs.—I have male specimens of a plant of tbis genus from Darjeeling, wbicb differ materially from those of E. digyna, and whicb I tbink belong to a third species. Tbe two, now attempted to be established, require to be examined in tbe living state.

Iu my Malacca collection occur specimens of a remarkable plant, whicb appears to me to belong to tbis sub-family, altbcugb its babit is widely different, being ratber that of Menispermeæ.

Calyx minutus irregularis, sub 5-partitus. *Petala* 5, acuminibus subulatis incurvis, *Stamina* 5, soluta. *Antheræ* lineares, uniloculares. Rudimentum *Pistilli.*

elongated floral envelopes, the one-celled anthers with ordinary filaments, connectiva and loculi, the generally capsular, annulated, one-celled fruit with simple parietal placentation, and the pendulous* etunicate seeds. There does not appear to be any peculiarity in the situation of the cirrhi, the particular nature of which is besides unknown.†

It passes I imagine into typical Cucurbitaceæ through Zanonia, in which the placentæ are so produced inwards as to meet in the axis, and still more through Telfaria, *(Hook.)* in which there appears to be a tendency to the triadelphous stamina, and which is represented as having horizontal and tunicated seeds.

It affords strong evidence against the hypothesis of the structure of Cucurbitaceous fruit advanced sometime ago by Dr. Wight, and which goes so far as to reverse what has hitherto been found to be the constant disposition of the vegetable leaf. For the gradation is complete (through Zanonia)‡ between the entirely and simply parietal placentation of Actinostemma, and the more complicated, but still parietal, placentation of typical Cucurbitaceæ.

I regret that it has not been in my power to give an accurate Catalogue of the species contained in the Chinese collections. It cannot be too often insisted on, that the usual necessary means of Botanical determination, and which are characteristic of *scientific*

Frutex *cirrhosus*, *ferrugineo-pubescens*. Folia *oblongo-ovata*, *integra*, *Menispermoidea vel Phytocrenoidea*. Cirrhi *tatarales*. Paniculæ *amplæ*, *folia excedentes*. Flores *minuti*; *perianthium utrumque extus ferrugineo-hirtum*.

Affinis Natsiato (Ham.); affinior Cucurbitaceis, Zanoniis. An Enkylæ sp.?

* Feuillea is described, (Endl. Gen. p. 934) as having the ovula erect, which probably is an error.

† Compare with this Arnott's character of this sub-family, Lond. Jour. Bot. 3, p. 272.

‡ The structure of the ovarium and fruit of Zanonia still appears to be unknown. While the ovula are distinctly parietal the placentæ are produced inwards so as to meet in the axis, resembling in a remarkable degree, the very young state of the placentation of Coccinia.

The fruit may be thus described. *Capsula* (clavata) unilocularis, infra apicem annulata, apice plano valvis tribus demum inflexis dehiscens; *placentea* 3 (trigonæ,) magnæ, usque ad axin productæ. *Semina* cujusque placentæ (fol. corpellarium duorum) bina, pendula, etunicata, marginato-alata.

Dr. Arnott, I believe, considers the wing of the seed to be of secondary importance. But the common form of the margin of Cucurbitaceous seeds would seem either to indicate the occurrence of no wing, or if any of two. In either case Zanonia appears remarkable.

I subjoin a character of the genus.

Zanonia, *Linn.*—*Flores* dioici; *Masc. Sepala* 3, *Petala* 5, *Stamina* 5, soluta, *antheris* unilocularibus. *Fœm. Perianthium* maris. *Ovarium* (inferum) unilocu-

institutions, do not exist in India, not even in the Public Botanic Gardens. The only way therefore by which I could hope to attach any interest to this paper was, by confining myself to the genera contained in it, which appeared to me either new to science, or imperfectly known.

EXPLANATION OF PLATE I.

IXONANTHES RETICULATA, DODECANDRA.

I. reticulata.

1. Flowering branch, natural size.
2. Flower.
3. Same, sepals, upper part of stamina, and style removed.
4. Anther, back view.
5. Ditto, front.
6. Pistillum and lower parts of stamina.

I. dodecandra.

7. Flower.
8. The same, sepals and upper parts of stamina and style cut away.
9. Pistillum, annulus, and lower parts of the filaments.
10. Part of the annulus and three filaments, inner face.
11. Anther, back view.
12. Ditto, front.
13. Pollen, ($\frac{1}{20}$ triplet).
14. Situation of petals in bud.
15. Stigma.
16. Ovulum.
17. Ovarium, transverse section.
18. Fruit.
19. Same, dehisced.
20. Seed.
21. Same, longitudinal section.
22. Abortive seed—*a.* body of the ovulum—*b.* funiculus.

lare, ob placentis intus productis pseudo-triloculare. *Ovula* 6, pendula. *Styli* 3, bipartiti. *Fructus* capsularis, vertice plano valvis tribus dehiscens; *placentæ* trigonæ, maximæ, in axi concurrentes. *Semina* marginato-alata.

HABITUS—Planteæ *indicæ, scandentes, carnosæ, glabræ.* Folia *indivisa, vel trisecta* (Arn). Flores *parvi, paniculati, viridescentes.* Antherarum *dehiscentia transversa.* Fructus *clavatus, subtrigonus, apicem infra annulatus.*

OBS.—Genus ab aliis subfamiliæ distinctum, *Alsomitra* excepta ?, sepalorum aliquorum cohesione, placentis intus productis, ovulorum numero, et seminibus marginato-alatis. *Z. Vightiana.* Arn. verisimiliter genere excludenda.

Chart
TO THE
TWENTY THIRD MEMOIR
ON THE LAW OF STORMS
being
THE PEN. & OR. COMP.Y STEAMER
PRECURSOR'S CYCLONE
21st to 23rd Oct.
1851
By
Henry Piddington
85
90
27°
20°
15°
Moorshedabad
Dacca
Calcutta
Balasore
Cuttack
False Pt
Black Pagoda
Juggernath
Ganjam
Coringa
Chittagong
Centre
Centre 21st
Portsmouth 21st
Lord Petre

PLATE II.

Corylopsis grata.

1. Flowering branch, var A.
2. Ditto, var. A. (Minza Peeza). } Natural size.
3. Fruit bearing branch, var. B. }
4. Flower.
5. Another laid open, pistillum removed.
6. A petal, cut across.
7. Flower, petals removed.
8. Anther, before dehiscence.
9. Anther, during dehiscence.
10. Anther, fully opened.
11. Stamen, and two of the larger glands, sometime after dehiscence, front view.
12. The same, viewed laterally.
13. Pollen, (in water).
14. Pistillum.
15. Same, longitudinal section.
16. Ovulum.
17. Ditto, longitudinal section.

PLATE III.

Actinostemma tenerum.

Male Plant, portion of, natural size.

1. Bud.
2. Ditto, anterior sepal removed.
4. Male organs, sepals and petals removed.
5. Stamina; front, back, and side views.
6. Pollen in the dry state.
7. Ditto, moistened.
8. Female flower.
9. Pistillum, sepals and petals removed.
10. Another pistillum, ovarium cut through longitudinally.
11. Ovulum.
12. Same, longitudinal section.
13. Long section of a young fruit, shewing two young seeds in situ.
14. The same, young seeds removed to shew the placentation.
15. Fruit.
16. Ditto, opened.

17. Upper part of the fruit with the seeds attached.
18. Seeds.
19. Seed, integument half removed to expose the embryo.
20. Embryo.

All excepting the portion of the male plant, from fresh specimens.

PLATE IV.

Gomphogyne cissiformis.

Enkylia digyna and trigyna.

Gomphogyne cissiformis.

1. Portion of a female plant, from a dried specimen in the Herbarium of Mr. Edgeworth; natural size.
2. Male flower; front view.
3. Stamen; back and front view.
4. Pollen.
5. Female flower.
6. Fruit.
7. Seed.

Enkylia digyna.

1. Portion of a fruit-bearing plant; natural size.
2. Male flower, just expanding.
3. Expanded male-flower.
4. Column of stamens, (base of perianth remaining,) after dehiscence of anthers.
5. Column of stamens, before dehiscence of anthers.
6. Vertical view of the under-face of apex of column.
7. Female flower, just expanding.
8. Vertical Section of ovarium, shewing the pendulous ovula, and the styles united by their bases.
9. *Enkylia trigyna.*
10. Female flower expanded, shewing the ong acuminated petals, 3 bifid styles, and smooth ovarium.
11. Unripe ovarium, bearing the styles.
12. Ripe bacca, shewing the remains of the three styles, and the annular mark above the middle.
13. Transverse section of unripe ovarium, shewing three cells.
14. Ripe seed seen sidewise.
15. Ditto seen edgewise, shewing the marginal grooves.

Actinostemma tenerum

Gomphogyne cissiformis

Enkylia digyna
— — trigyna

Notes on the Geology of the Punjab Salt Range, by W. Theobald, *Junr. Assistant, Geological Survey of India, late of the Punjab Geological Survey.*

The present paper was originally written upwards of three years ago, but has been subsequently revised and curtailed owing to the prior publication of two papers on the same subject, one, a sketch drawn up by Sir R. Murchison from private letters of Dr. Fleming, which appeared in the Quarterly Journal of the Geological Society for August, 1853, and the other the official report of Dr. Fleming, published in the As. Soc. Journ. Nos. 3, 4 and 5 of 1853. From the great discrepancy between these papers, it is certain that the sketch in the Quarterly Journal was published without the knowledge or consent of Dr. Fleming, the theory therein advocated of the eruptive origin of the saliferous rocks, being abandoned in favour of the more mature and correct views set forth in his report to Government. This explanation is due to Dr. Fleming, who in the present instance may well complain of the inconsiderate zeal of his friends at home in his behalf.—W. T.

Before proceeding to describe the Geology of the range, it will, I think, be convenient to give a brief sketch of its physical features and general appearance, particularly as such in a great measure depend on peculiarities in Geological structure. The salt range, which forms as it were a barrier across the upper part of the Sind-Sagur Doab, may be described as a regular and nearly continuous chain of hills, with an included table-land in parts, stretching from the vicinity of Jhilum to Mári on the Indus, a distance of 120 miles in a straight line. A line drawn from Jhilum to Mt. Sakesa, the highest point in the range, nearly indicates the centre of the range between these points, a distance of 104 miles, and bears magnetically 254°. From Mt. Sakesa to Mári on Indus, the distance is 35 miles and the range here makes a sharp bend, the magnetic bearing of this portion of it being 323°. These two lines of bearing including an angle of 69 degrees, are evidently the result of those forces which originally elevated the range, and the regularity of the upheaval is such, that the three principal hills, namely, Tilla, Karingli and Sakesa are situated on one and the same straight line, nearly; each of them too being thrown up by faults transverse to the main axis of the range and striking N. E. and S. W. The width of the range between Mts. Sakesa and Karingli a distance of 65 miles, is

pretty regular, averaging 10 miles, but at either end towards Mári or Jhilum it is not more than 3 miles, and the transition is somewhat abrupt, and due to the higher inclination of the strata there, causing a corresponding decrease in width. Midway however, between Sakesa and Mári the range acquires for a short distance the width of seven miles.

Towards the east the salt range may be said to commence at the celebrated fort of Rhotás, 10 miles W. N. W. from Jhilum, the fort being built on the end of the hilly ridge or spur which tails off from the N. E. declivity of Mt. Tilla. This hill is 3000* feet above the sea and forms a grand and imposing feature in the district. It rises abruptly and presents an escarped force towards Jhilum and a very steep slope to the N. W. To the W. N. W. it falls rapidly down and merges into the broken ground which skirts and closes up the range along its entire length to the north, and can hardly be termed hilly though very impracticable and deeply excavated by torrents. The portion of the range now to be considered, between Mts. Tilla and Sakesa is in every respect most important. The first considerable hill west of Tilla is Karingli, distant 23½ miles from it to the W. S. W. and between which a considerable but very circuitous nulla (the Boonah) winds, traversing the range at this point and falling, near Bhimba, into the Jhilum some 14 miles below the station of the same name. Four miles S. S. E. of Karingli is situated the romantic fort of Kusak; perched on a beetling triangular peak or needle, isolated by denudation from the neighbouring table-land and falling with a sheer and precipitous descent towards the plain to the south, which appears spread out beneath it in almost panoramic order. Between Kusak and Karingli the land forms a kind of flat valley, which may be regarded as the commencement of that table-land which stretches with increasing breadth and elevation to the foot of Mt. Sakesa. At its eastern end this table-land is not more than 2200 feet above the sea at most, but towards Sakesa it continuously rises to about 2600 feet, bounded to the

* For my general ideas respecting the height of the range I am indebted to W. Purdon, Esq. who was at considerable pains to check the few Barometrical observations by the boiling point and by angular measurements where practicable, though from such scanty and disconnected data, approximation is all that can be expected.

north and south by skirting ridges of 200 feet or to greater elevation. These ridges frequently anastomose and give rise to several parallel vallies which need not be specially dwelt upon. Mt. Sakesa, the most considerable hill in the range, is fully 5000 feet in height, but its position among other hills of considerable altitude greatly diminishes the appearance it would otherwise make. It is thrown up across barrier-like and cuts off the table-land which terminates at its base, and to the south graduates into the confused mass of hills called the Patial hills, many of which must be fully 3000 feet high. As previously mentioned, Mt. Sakesa is thrown up by a N. E. to S. W. fault, the beds dipping at a variable but high angle to the N. W. This fault has evidently brought up the saliferous marl to the surface as at the S. E. base of the hill a large salt lake is formed though the salt marl is not fairly seen. A salt lake is also formed in a similar manner, by the saliferous marl being brought to the surface by a fault at Kalla-Kahar, 18 miles due west of Karingli, where however, the fault is not clearly seen, though the marl is pretty plentiful. The Sakesa fault is however, well marked and causes a vertical displacement of strata of certainly 1000 feet and perhaps more. From Mt. Sakesa the range makes an abrupt bend to the N. W. and consists of numerous knife-like ridges, the strata constituting which, are thrown up at a high angle, vertical in places, thereby decreasing the width of the range, to which cause the effects of denudation must be added, which are very forcibly exhibited near Musakhel, twelve miles W. N. W. from Sakesa, situated in a deep bay eaten out of the hills, which at that point are not more than one mile across and perforated by a considerable nulla, that flows from the north and during rain discharges itself into the Indus. To the north along its entire length, the range is bounded by an arid and uninviting tract of broken ground with which it becomes blended and throughout which villages and water are scarce. To this last want rather than to the unkindly nature of the soil, must be attributed the general sterile aspect, as at a greater distance from the range where water and open space are procurable, large villages and tolerable crops attest the capabilities of the soil. Along its southern boundary the range presents much bolder features, being on that side cut off along nearly its entire length by either a

fine escarpment or by a range of huge craggy buttresses, formed by the detachment and subsidence en masse of great slices of the hard upper strata (limestone) of colossal dimensions. Below these again tail off moraine-wise streams of stony debris resulting from the destruction of the various beds of the range; which, when viewed from the plains, represent an interminable series of headlands and promontories, and all the characteristic features of an exposed rocky coast. So evident are the means to which this appearance is due, that the mind almost unconsciously dwells on those fine lines of Shakespear descriptive of a similar scene in a far distant land, and when standing on the verge of the escarpment, one is forced as readily acknowledges their applicability to the scene beneath, as though a mighty ocean still, as of yore, rolled its waves over the land of the five streams.

"Stand still.—
How fearful
And dizzy 'tis to cast one's eyes so low!
The crows and choughs, that wing the midway air,
Shew scarce so gross as beetles: the murmuring surge,
That on the unnumbered idle pebbles chafes,
Cannot be heard so high."

As I shall again refer to the physical features of the south side of the range, I will now briefly notice the salt mines. The principal Cis Indus mines are situated at Kiura, six miles north from Pind Dádan Khán and fifty miles from Jhilum, other mines exist near Surdi, Makraj, Varcha, &c. and indeed wherever the saliferous marl is largely developed, but a description of one will suffice, as Kiura mines merely differ from the rest in size and importance. The village of Kiura is situated up one of the gorges, which are so numerous along the southern side of the range, and is built on the tail of the hill in which the mines are situated. The two most important mines (neglecting the Makad and Farwára mines) are the Sujuála and Baggi, which last is a small ill-ventilated mine, the salt from which is a favourite with the merchants, though without any good foundation for the preference shewn it. The road to the Sujuála mine (some twenty minutes walk from the village) is carried along the side of the hill, and rises considerably to the mouth of the

mine. The gallery leading into the mine is very steep as may be imagined by the fact of part of the chamber where the salt is worked, being immediately under the external entrance. The gallery, which is partly natural, partly artificial, passes through marl and gypsum, and averages six feet by three. The form of the mine is an irregular oval, 400 feet long and from 60 to 160 feet broad. The height is probably not less than 35 feet, though this is a mere guess. The floor slopes considerably from the entrance and the brine which percolates through the mine collects along the sides, forming pools, which, by the faint light of the lamps, have a very stygian and doleful aspect. What the thickness of the salt is, it is impossible to ascertain, but some idea of its extent may be formed by the fact of several mines being excavated at different levels in the crystalline salt, each capable of containing a very decent sized house. It by no means, however, follows that the difference of level between the mines necessarily affords any indication of the thickness of the salt, as the whole of this vast bed has been faulted and displaced in the most extraordinary manner.

I now come more particularly to the Geology of the range and should here premise that I have no wish to institute any comparison between the deposits in the Salt Range and similar ones in Europe. The great and interesting problem of geological identity I leave to abler hands and trust that ere long, the collections of fossils forwarded to Europe will have gone far to clear up all doubts on the point and to settle definitely the age of the rocks under consideration. I will add however that regarding the mere lithological characters of the strata, it would not be difficult to identify almost every bed of the permian and saliferous rocks of Europe, in the beds of the salt range, inferior to the nummulite limestone, but in an inversed order to what they present in Europe. In taking a general view of the Geology of the salt range, the question that first of all presents itself is, "What has become of the other half of the range and the rest of those sheets of solid rock, the abrupt and broken edges of which, constitute the escarped and rugged southern margin of the range from Mári to Bhotás, from the Jhilum to the Indus?" This question, though presenting few difficulties to the Geologist, is far from uninteresting, and a brief glance may here be taken at the

state of things which preceded, and the agencies which resulted in, the formation of the Punjab Salt Range as we now see it. As the entire series of rocks under consideration are conformable, from the lowest red marl to the uppermost tertiary bed, it will merely be necessary to imagine, in order to form some idea of the formation of the range, that state of things which existed during the deposition of the uppermost bed of the tertiaries, and which immediately preceded the operation of those forces which led to the upheaval and present form of the range. That radical changes have been constantly in action is not less certain, than that such changes never existed in greater degree, than during the most recent periods of geological history—even confining the observation to the Salt Range. The upper or nummulite limestone,having a close resemblance in many points to the chalk, was without doubt deposited in a similar manner in an oceanic basin, which gradually filling up induced a condition favourable to the deposition of the upper sands and marls which are of an extremely recent (geological) date. These beds are doubtless shallow, estuary or lacustrine deposits, containing as they do, not more than three or four species of shells, (two being a kind of mussel and traces of a univalve or so) but an immense quantity of teeth, bones, and other exuviæ of mammalia, crocodiles, tortoises, &c. with fragments of fossil wood and even trunk of trees. Subsequent to the deposition of the earlier beds of these deposits, a gradual subsidence must have occurred, as is proved by the immense thickness of these shallow-water strata, the minimum thickness of which cannot fall below 10,000 feet and probably exceeds double that amount. It is pretty safe to assume that these are identical with the Siwalik tertiaries, but their range to the north, north-west and west will for many years probably, remain unknown, as however they pass into the underlying nummulite limestone, they will probably be found to extend at least as far as that rock which is known to be largely developed throughout Afghánistan. We may now suppose the whole of the tertiaries deposited, and by the continued sinking of the land, covered by the waters of the ocean—for without such an agent, it is difficult to account for the removal of such vast sheets of strata as have every where disappeared, or the formation of that line of cliffs previously described. We should otherwise see

the highest land entirely composed of tertiaries, for what mere atmospheric forces could possibly denude 10,000 feet and more of sands, marls and conglomerates; and even deeply excavate the underlying solid limestone—or where could such agency alone dispose of the debris? It may I think be legitimately allowed that when the first elevatory forces were felt along the axis of the range, the whole, in extended sheets constituted the bottom of an ocean. The force of currents would naturally act with peculiar power on a narrow and elevated ridge of soft strata, and the greatest amount of denudation, possibly occurred previous to their summits emerging above the surface; when however an extended line of coast was raised, the breaching power of the waves could effectually act on the harder strata, and proofs of this power are every where abundant through the range. The table-land often presents a series of vallies excavated in the tertiaries and upper limestone, all discharging themselves to the south over the escarpment or at the head of narrow gorges which enter the range, and which, in many instances, seem to have been excavated backwards in the manner of the well-known Niagara falls, by forces no longer existing. This series of vallies is exactly imitated on a small scale by the channels cut by the retiring tide in a stiff mud bank. A short description of the different beds, is now all that remains to add as a glance at the sections appended to this paper will give an idea of the geological constitution of the range more readily than any long verbal description.

The following are the most important beds in the range with their maximum estimated thickness (ascending).

No. 1.	Red marl and gypsum with rock salt, ...	1,500
2.	Dark red sandstone, fine-grained with black iron-sand partings, ...	700
3.	Dark arenaceous shales with green earth, ...	250
4.	Cupriferous purple shale, and red friable grits and conglomerates, ...	400
5.	Hard fawn-coloured sandstone with bands of conglomerate, ...	700
6.	Lower or (productus) limestone, ...	1,100
7.	Red and green white spotted shales and sandstones,	600

8.	Carbonaceous shales, sandstone and lignite, ...	80
9.	Upper or Nummulitic limestone, ...	1,100
10.	Nummulitic limestone conglomerate, green, red and yellow ossiferous sands, marls, and conglomerates (minimum), ...	10,000
	Total, ...	16,430

Although the aggregate thickness of the strata in the range, cannot be estimated at much less than 6500 feet, yet two or more strata are rarely fully developed at the same point, and the thickness of the different strata vary very considerably at different parts of the range. Thus at Mt. Tilla the upper limestone aud spotted sands are each only about 100 feet thick, the maximum thickness of the first rock not being attained before crossing the Indus, the lower limestone is not met with at all, and the fawn-coloured limestone, here largely developed, is soon entirely lost towards the west.

No. 1. Red marl. This formation, for it deserves the name, is largely developed along the entire southern base of the range with occasional exceptions towards either extremity, and is here and there brought to the surface by faults within the range itself, as previously described, at Kalla Kahar, Mt. Sakesa, and doubtfully at some other spots. The colour of the marl is usually a dull crimson red, inclining to plum colour, or purplish towards the upper part where by the intervention of a few arenaceous bands, it passes into the overlying sandstone. It is sometimes met with of an extremely florid colour which seems to be especially the case in the vicinity of trap as in the Kiura gorge and the shoulder of Karingli. The only minerals found in it are small rock crystals, usually marled and imperfect, which occur plentifully at Mári on Indus and Kála Bágh, and sparingly near Nurpur and Sardi. Iron pyrites is also found in small quantities in the gypsum at Sardi and elsewhere. Gypsum occurs in the marl in thick beds evidently stratified, also in thin seams aud foliæ, and in large lumps and blocks, but the latter form, is I think, merely the result of the beds of gypsum breaking up and the fragments becoming impacted in the soft and yielding marl by pressure and the movement *en masse* of the lower strata. The handsomest variety of gypsum is the pure white or pink saccharine

Gomphogyne cissiformis

Enkylia digyna
trigyna

kind. It also occurs coarsely crystalline of a greyish white colour, there is also a compact grey kind, but large blocks of the best kinds are not readily got. The ordinary gypsum is greyish white mottled, and varieties occur of various shades of red, brown, and greenish. Small crystals of selenite are also abundant in the marl, which owes its preservation from being washed away in a great measure to this mineral. The gypsum and salt appear to occupy a high position in the marl, but it is difficult to assign them any particular place. The salt occurs in strata of about two feet or more in thickness, separated by a thin parting of red marl, of not more than half an inch, so that the entire body of salt may be regarded as one band of probably not less than 100 feet in thickness. The upper and lower layers of salt decrease in thickness while the partings of marl are proportionately enlarged, and contain coarse granules of salt, so that a blending occurs between the crystalline salt and the red marl which greatly opposes any attempt to examine their junction. The salt is, I believe, in one great band only, but the dislocations which the red marl has suffered, have so broken up the original bed and so altered the levels of the disconnected portions of the sheet, that much obscurity unavoidably exists on this point. The surface planes of the beds of salt are quite parallel and smooth, abruptly terminating and cutting off the cubes of which the bed of salt consists. These cubes dissected out by the action of water in the mine, and standing in high relief, form a really beautiful object when lighted up by the miners' lamps, and the salt even in large blocks possesses a very mild and pleasing translucency. Fractures in the salt usually occur transverse to the bedding, and it is common to see in the mines and galleries, huge cubic fragments depending as it were from the roof as though arrested in the very act of falling. These fragments frequently move, and are arrested before finally coming down, the salt which crumbles from their sharp edges giving timely warning to those beneath. This, together with the fact of the mines being deserted during the most dangerous part of the year (the rains), accounts for the paucity of serious accidents among the miners, who in most instances are the victims of their own carelessness. Most of the falls, oddly enough, seem to take place at night. *In no part of the red marl, have I ever observed a fragment of any foreign rock*

or fossil of any description. One curious exception however, must be mentioned, which is the occasional occurrence of small angular fragments of trap at Kiura and elsewhere. The trap is the same that occurs altering the marl in various parts of the range, and every fragment is enveloped in a thin coat of fibrous gypsum, which has evidently separated from the marl and ranged round the trap nucleus as a centre. This gypsum coat is not one-twentieth of an inch thick and the fragments of trap vary from the size of a pea to that of an apple. In the lower part of the red marl occur a few thin bands of a fine compact argillaceous shale and fine argillaceous sandstone, having a few dark filmy partings of a black colour and seemingly carbonaceous character. The shale is compact of a peculiar ashen colour and contains crystals of selenite, which in parts being decomposed give this curious rock a singular honey-combed aspect. The sandstone is fine and thin bedded in the extreme, the strata resembling in arrangement sheets of paper, but the whole is firmly cemented by infiltrated selenite, the crystals of which, form partings between some of the beds and impress a peculiar character on the whole. These beds are singularly contorted, for instance on the left hand side entering the Kiura gorge, and though of very insignificant thickness (some few feet) appear traceable wherever the red marl is much developed.

No. 2. Red sandstone. Above the red marl occur several feet of dark red thin bedded marly sandstones, forming a link between the marl and superincumbent sandstone. This sandstone is greatly developed throughout the range, more so if any where, towards the eastern end where it is fully 600 feet thick. Its colour is dark brick or plum red, and it is generally thin bedded. The upper beds become grayish white, and white and red, but retain the same fine uniform character as the lower. This stone is much used for building, owing to the facility with which it splits into slabs of the required thickness, but is rather soft and its applicability thereby decreased. It absorbs water also readily and is sometimes subject to a saline efflorescence. The pale upper beds, or freestones, though less fissile, are not so faulty in either respect. The red sandstone is rarely, if ever, seen ripple-marked, but the atmospheric action creates curious rugosities in the surface of some of its beds,

dependant seemingly on the varying density of the stone. Throughout this sandstone not even a pebble is observable, but above it occurs a conglomerate from one to six feet in thickness. The paste, which is very scanty, is a greenish arenaceous clay and the pebbles are from the size of a nutmeg to that of a melon, most being of a large size, and consisting of porpheries and primitive rocks well rounded and polished.

No. 3. The beds above the red sandstone consist of a series of sandstones and arenaceous shales about 200 feet thick and pretty generally developed throughout the range. The prevailing colours are gray and green, the shales containing much green earth and indistinct carbonaceous markings.

No. 4. Cupriferous shale. This deposit though rather locally developed, is one of decided interest. It consists chiefly of a purple clay containing granular concretions of copper ore, and of beds of sandstone and conglomerate of a peculiar character also containing traces of copper. The formation does not extend much farther east than Nurpur, from whence it can be traced to within some ten miles of the Indus. The characteristic purple clay is more circumscribed and is best seen in the vicinity of Kata and between Kata and Musakhel. The lower beds consist of shales and sandstones, of some thickness, then comes a bed of shale containing abundantly balls of radiated sulphate of barytes, and some curious sintery concretions, above this occurs a purple greasy looking shale the most characteristic bed of the whole, and lastly a series of sands and conglomerates fully 250 feet thick in places, and usually forming half or more of the entire deposit. These arenaceous beds are composed chiefly of the sharp sand of granitic rocks and not unfrequently contain crystals of felspar imparting a porphyritic aspect to the sandstone. Some beds indeed so resemble a granitic compound that in hand specimens, they might readily be taken for such. This is especially observable at Nurpur, where some trappean sublimation has penetrated the pores of one of these beds, which presents the appearance of any thing but a sandstone. The conglomerates do not usually contain very large boulders, but are rather coarse grits of a prevailing red colour with an included pebble here and there. Some of the beds afford unquestionable indications of the simul-

taneous existence of volcanic forces in the vicinity, and the following passage from Lyell's Elements of Geology is extremely applicable to the beds in question; it occurs at page 481, treating of the trap of the new red sandstone period. "Some beds of grit mingled with ordinary red marl RESEMBLE SANDS EJECTED FROM A CRATER, and in the stratified conglomerates occurring near Tiverton are many irregular fragments of trap-porphery, some of them one or two tons in weight intermingled with pebbles of other rocks. These angular fragments were probably thrown out from volcanic vents, and fell upon sedimentary matter then in course of deposition." The pebbles in these beds are porpheries, granite, trap, and some of the harder schists, most of them like the Tiverton sands appearing to have passed a fiery ordeal and bearing traces of its action. The copper ore, rather rare in these grits is somewhat more abundant in the purple shale. It occurs in small nodules rarely larger than a pea and is quite insignificant in an economic point of view. The following is an analysis, by Dr. Fleming, of a specimen of the ore from Musakhel, published in the *Delhi Gazette*, 1850.

Copper, ...	75.830
Sulphuret of lead, ...	3.155
Sulphur, ...	21.000
Iron antimony, ...	a trace
Total,.. ..	99.985

Dr. Fleming is however, mistaken in naming limestone as the matrix, and was probably misled in this point by the party who furnished him with the specimen.

No. 5. Above the copper shale and perhaps alternating with it occurs a series of sandstones and conglomerates forming an important group. They are mostly highly silicious but some soft beds occur in them. The most remarkable bed is a light coloured extremely hard sandstone weathering of a fawn colour. In the weathered state, some beds so resemble limestone that they have been mistaken for it by, I believe, every one who has treated of the geology of the range, and I was myself under the same impression for some time. It frequently occurs brecciated and cavernous, with seams of carbonate of limo and stalactites in the fissures. It

attains its greatest development at the east end of the range near Báganwalla and Kusak, dwindling away thence westward. The summit of Mt. Tilla and Mt. Karingli and much of the highland near, is of this sandstone. In it occur subordinate beds of a dark blue-grey variety, very hard and silicious, and bands of conglomerate. The boulders in these last beds are granite, porphyry, &c., some few being nearly a ton in weight, and all well rounded and polished. The paste is a sandstone or shale, but some of the finer conglomerates or rather grits are united by a silicious paste, as in some English pudding-stones. The paste of some of these beds and of some of the sands, much resembles chert, and appears to be a chemical deposit. The bands of conglomerate are dispersed irregularly throughout the deposit, and are rarely more than two or three feet thick.

No 6. Lower or productus limestone. Above the last described beds, occurs a series of limestones of great thickness, which may be termed the lower, in contradistinction to the upper or nummulitic limestone. It is first traceable to the east near Nurpur and thence gradually thickens towards the west, till it attains its maximum development across the Indus in the Kotki pass, ten miles N. W. from Kála Bágh. The series consists of limestones compact and thin-bedded, with some subordinate arenaceous and shaly beds intermixed. Their arrangement is somewhat complicated and obscure at different points, but the following brief sketch will convey a tolerably correct idea of the whole. The lowest division consists of

a. An insignificant deposit of sands of variable thickness: above which occurs

b. A deposit of limestones of various characters, fully 600 feet thick: lastly.

c. A series of sands, shales and limestones, of about 500 feet in thickness.

a. The only remarkable bed in this division is a coarse silicious sandstone, with some calcarious matter and carbonaceous stains and bits of lignite. Its colour is a pretty pure white, and in appearance it resembles some of the Fontainbleau sands.

b. This is a most important division, and comprises a variety of limestones mostly highly fossiliferous. The prevailing colour is a dark or light grey, the beds being usually compact, thick-bedded, and contain-

ing numerous fossils. (Terebratula, productus, spirifer, orthis, &c., with corals tubular and retiform, and bones of fishes.) The beds in which these fossils are most numerous are thin beds of a shaly character, but they also occur in the most compact limestone. These lower limestones are much fissured, the cracks dividing fossils as neatly as could be effected by a saw, and the surfaces being often re-cemented by pure white calcspar. Above these dark limestones occur several light yellowish limestones abounding in encrinites. The most common colours are greyish, white or yellow, and some of the beds would yield an excellent and beautiful marble. The very yellow varieties, however, seem rather soft and impure, owing their colour to the presence of argil and iron, and weathering into irregular holes filled with a ferruginous yellow clay. The fossils in this limestone are not numerous, with the exception of encrinites, and these are frequently obliterated by the crystalline character of the stone.

c. The third division is represented in the salt range by a series of sandstones and arenaceous shales with a few beds of limestone. The sands contain much iron and are of a reddish or yellowish white colour, a few traces of plants being all the fossils they contain. At Kotki, however, ten miles N. W. from Kála Bágh, this division is fully as thick as the lower, and besides shales and sandstones contains many thin-bedded limestones, some of them oolitic in structure. The most interesting bed is an arenaceous shale of a very peculiar brown or greenish-brown colour. This bed altogether is not much less than 100 feet thick, and contains the bones and teeth of some large saurian (?), the remains of a few crustaceans, and some five or six genera of bivalves including a gryphæa; but the most numerous fossils are belemnites, which in places are absolutely more in bulk than the including matrix. They swarm by myriads, and are accompanied by a few ammonites, usually in a bad state of preservation, whilst the belemnites are in the most perfect state possible. The fossils in this bed (except the belemnites, which occur throughout,) are not found indiscriminately but usually associated, so that one or two species constitute a marked band, though the lithological character varies but little. The lower part alone contains fossils; the upper half being quite devoid of them, even of belemnites. The bones in this bed are rather friable, but not ill-preserved; and the

teeth, though brittle, are pretty perfect: one I noticed that, when perfect, could not have been much under five inches in length: these teeth are conical, black, and finely striated. This interesting bed is high up in the series, and might perhaps be advantageously separated from it. The other beds met with at Kotki are sandstones of the character previously described, and a great deposit of thin-bedded limestones. Many of these are devoid of fossils; others again are quite shell-limestones, consisting of broken and undistinguishable fragments of shells, some few having an oolitic structure. Here also occurs a very curious band, some six inches thick, of oolitic limestone passing into shell limestone. To the eye it appears like a brown sandstone; but when examined with a glass is found to consist of an infinite number of globules less in size than those precious pills, which many in these enlightened times find small difficulty in swallowing. These globules have a lustre like burnished gold, and some are finely tarnished. They are unaffected by an acid, which dissolves the calcareous cement by which they are united; and appear to be a peculiar indurated clay, though I am unable to speak confidently regarding their composition. One curious point regarding this series is the suddenness with which fossils appear in it, none of any description to my knowledge being found beneath it; yet in its lower beds several species occur of Terebratula, Orthis, Productus, Spirifer, &c. with several corals, bones and teeth of fish, &c. Higher up encrinites abound, with chambered shells, nautili,* ceratites, &c., and higher still (trans-Indus), Gryphæa, with ammonites and belemnites in abundance.†

* Vide Dr. Fleming's Report, J. A. S.

† As regards the existence of ceratites and orthoceratites in the same band, I am in the last degree sceptical. Throughout the range or even Trans-Indus, I have never seen an orthoceratite; though that is no proof that they may not be found: but some of the belemnites are so large that their chambered portion might readily, under some circumstances, be taken for part of an orthoceratite. But this explanation is unsatisfactory, as belemnites are rare (if they occur at all) in the ceratite beds, and they are certainly most common in the bed previously described as high in the series at Kotki, and they are rare in the range. Yet the ceratite beds are also high in the series, and this view seems to me worth attention, as long as there remains any doubt whether orthoceratites occur or not. While on the subject of belemnites, I may relate a curious use which has been found for them in these parts

No. 7.—Above the limestone last described occurs a considerable deposit of spotted sandstones and marls, about 700 feet in thickness or less. This deposit is rather circumscribed, occurring only towards the east end of the range. At Mt. Tilla it is seen about 100 feet thick, but soon attains its maximum development at Bághanwalla, after which it is soon lost to the west. The prevailing tints are red and green. The sandstones are generally a full pinkish red with round white spots, from a quarter of an inch to an inch or more in diameter, they are of moderate hardness and much used for curry-stones and similar purposes. The marls occur red and green, spotted like the sandstones, and present faint marks and casts, as of annelidous animals: no fossils, however, are found in any of the beds. A curious appearance is seen in some of these beds. Many of the sandstones are separated by marl partings, and from their surface crystals are often seen half projecting into the marly layer. These crystals are cubes, with depressed pyramids occupying the face of the cube; their usual size is a quarter of an inch, some even so much as one inch, and they frequently occur marled. They consist of sandstone, and the hollow faces of the crystals are only seen when the marl enveloping them is removed, when they stand out in relief, studding the surface of the sandstone like so many crystals of bay-salt. All of the beds of this division are much ripple-marked, and the sands and marls alternate pretty regularly.

No. 8.—Beneath the upper or nummulitic limestone, and above the last described sands, occur a few sandstones which are uniformly developed throughout the range. The most characteristic bed is a sandstone of not more than 25 feet in thickness, rather friable and

From an early number of the *Englishman* of 1851, it would appear that a large number of these fossils, many maunds in weight, were collected to serve as fuel for the Indus steamers at Kála Bágh. The mystery how belemnites could possibly be mistaken for coal might long have remained unsolved, had not the above statement elicited an angry explanation in another Journal; by which it appeared, that in the orders issued for the discovery of coal, the Persian word for that mineral was mistaken for a somewhat similar one in the same language signifying "*finger*," and the natives accordingly thought that the fingers or belemnites so plentiful on the hills were the objects required, though the uses to which they would be applied by the Feringhis, or the means of rendering them suitable for fuel, must ever have remained a subject of profound and hopeless speculation.

of a whitish colour with carbonaceous markings. This bed is, however, usually associated with carbonaceous shales and lignite of very variable thickness. The deposit is most remarkable for affording the so-called "coals" of the range, to wit, the above carbonaceous shales and lignite. In no part of the range is any fuel that can possibly prove of economic value. The following extract, from a report I submitted on the Bághanwalla "coal" will, I think, confirm this view; that being the only place where there is the least approach to a regular seam.

"Para. 3.—Having satisfied myself as to the state of the road, I commenced working into the face of the seam of coal on the west bank of the nullah, in which it is exposed; but found the quality deteriorate, and, on the third day, the coal had so thinned out and was so earthy, that I relinquished the spot, and recommenced on the east bank where previous excavations had been made, but which was less eligible, as the face of the seam there forms the bed of a transverse gully, which would with difficulty during rain be prevented from filling the works with water. The coal from this spot is as good as the seam affords, and some hundred maunds may be readily obtained by superficial digging."

I may also add that, after lying some time exposed, the whole of the coal mined might be easily screened through a $\frac{1}{2}$ or $\frac{1}{4}$ inch sieve. This seam is more free from sulphur (iron pyrites) than is generally the case, and also is associated with small crystals of selenite. The following is a comparison of the Bághanwalla and Kála Bágh lignites.

	Volatile matter per cent.
Portion of a large lump of Kála Bágh lignite, colour black, and seemed free from pyrites, ...	53
Bághanwalla lignite in coarse powder, colour brownish-black, ...	34

The position of the Kála Bágh lignite is somewhat different from that in the salt range proper. It occurs indeed beneath the upper limestone, but is a part of that series, as may be seen by the following section:

Section of alum shales at Kotki (Trans-Indus).

No. 8.—Soft yellowish sandstone containing the lignites of the range,..... 25 ft.

No. 9.—Carbonaceous shale, (alum shales,) containing the Kála Bágh coals,..... 25

„ Nummulitic limestone,..... 60

„ Carbonaceous (alum) shales, with nummulitic limestone bands,..... 80

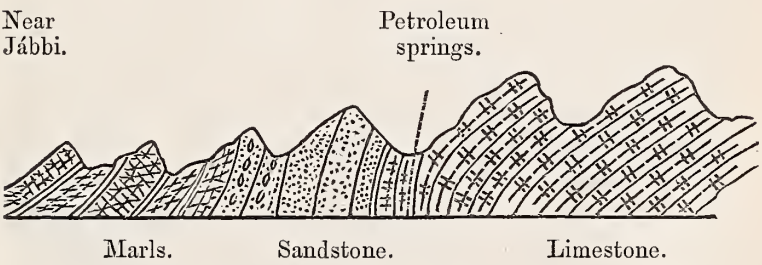
„ Nummulitic limestone,.....

As these beds are merely indicated in the range, the manufacture of alum is confined to the west of the Indus, for which Kála Bágh has long been celebrated. The supply of shale or "rol" is quite exhaustless, and is obtained by cutting shafts and galleries into the outcrop of the beds. These workings sometimes ignite spontaneously, and the combustion proceeds very actively, owing to the large amount of jet and carbon in the shales. When at Kála Bágh I entered one of these miniature volcanoes, and accidentally selected the *upcast* shaft as my way out; my sufferings in which should act as a warning in future to visitors to the mines: for I can fancy few less pleasant ways of entering into or quitting the world, as the case may be, than through this dread Avernus.

No. 9.—Nummulitic or upper limestone.—This limestone is one of the most important and extensively developed rocks in the range; occurring throughout its entire extent, and forming the greater portion of the table-land and the summit of Mt. Sakesa. It is first seen at the north-west base of Mt. Tilla, but is there not more than 100 feet thick; thence it rapidly becomes thicker, but is not more than 800 feet thick anywhere in the range. At Kotki, however, the thickness is not under 1100 feet, including the shaly associated beds previously mentioned. The prevailing colour of the rock is white and whitish-grey, much of the compact kind being pink, and some of the softer beds are yellow. A few argillaceous and dark bituminous bands occur, but the general character of the rock is pretty pure. Flints are common, generally as nodules, like the English chalk flints, and in strings; but towards the west end of the range and across the Indus the flint also occurs in strata or plates.*

* I should previously have mentioned that an impure flint or chert of a yellowish colour occurs sparingly in the lower limestone.

The nodules are generally of a cherty character and of a pinkish or white colour, but towards the west they acquire a dark grey colour or even black, and were formerly largely used for the Seikh muskets, though tougher than good English flints and more splintery besides. The whole limestone is extremely fossiliferous ; abounding in nummulites, and many species of bivalves and univalves of a very modern character : shark's teeth and echinoderms are also not uncommon ; but no corals are seen, neither are any fossils common to the upper and lower limestones, though in places separated by only a few intervening beds. In this limestone sulphur occurs and petroleum, at a few places at the west end of the range. The most considerable flow of petroleum takes place at Jábbi, nine miles south-east of Kála Bágh. The following sketch explains its mode of occurrence.



The oil ascends with some water and accumulates in pools till collected by the natives. It is very fluid and of a deep rich red brown, quite devoid of that peculiar green tint of the Rangoon oil. It is chiefly used as an application to mangy camels. The sulphur is found in small lumps and crystals in the limestone not far off. The rock containing it does not effervesce, and resembles gypsum. The pink varieties of the limestone would make handsome marbles ; but the natives are unable to dress so hard a stone with the chisel, or rather are ignorant of the process : they cut it, however, with emery and sand into a variety of small articles. A very handsome but soft mottled marble occurs near Sardi ; it is of a purplish colour, finely imitative of woody fibre, and is rather I think a bed above the limestone, and one of the tertiary series. Near the petroleum

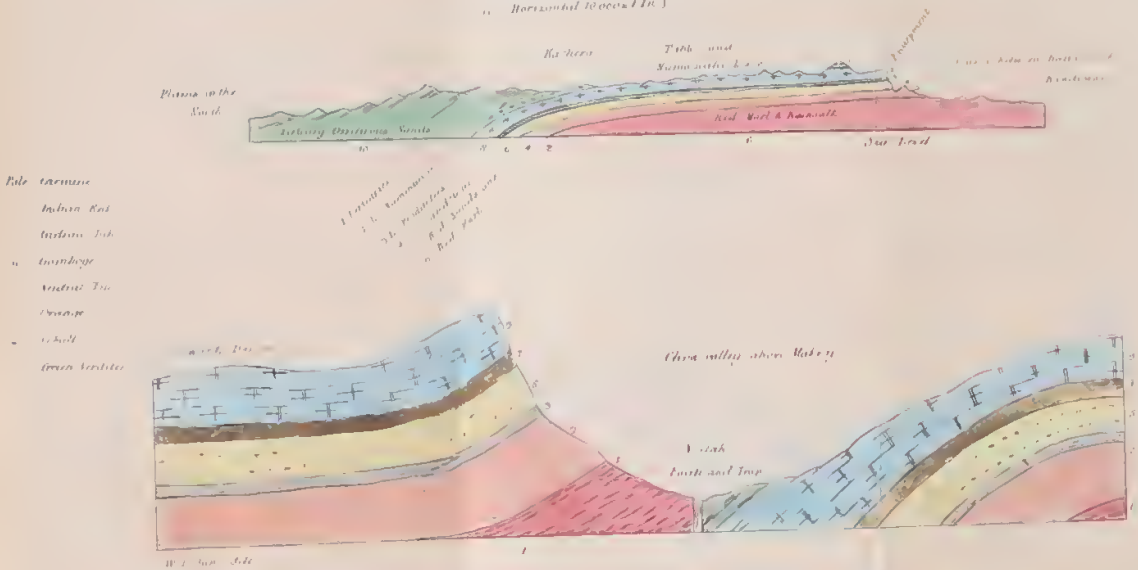
locality mentioned above, occur some beds subordinate to the limestone, which are worthy of notice. They appear originally to have been a shaly limestone, subseqnently subjected to a pecnliar action, which has given rise to a number of concretions, causing the whole closely to resemble a conglomerate. These bodies are flattened spheres or ovoids, varying in size from that of a pea to a small apple, the most regnlar being the size and shape of a flat plnm and weathering out of the soft matrix; they are numerous enough in places to hide the ground. They have a conchoidal fracture, and exhibit wavy lines and watering like Egyptian jasper, often but not invariably a nnmmulite bing the nucleus, ronnd which the crystalline particles have ranged themselves; sometimes only a portion of this nucleus remains, the rest having become merged in the substance of the nodule. Their prevailing colonr is brown, of varions shades of yellow and red. A somewhat similar rock is associated with the mottled limestone before described, near Sardi.

No. 10. Limestone conglomerate.—Above the last described limestone occnrs a conglomerate of a somewhat varied character, but continuous throughout the range. At the east end of the range it is a conglomerate of limestone boulders included in a limestone paste. Towards the west this passes into a sandstone containing many small nummulites, and across the Indus it is represented by a coarse grit, with an occasional limestone pebble inclnded. The pebbles vary, but are usually small; some however are several pounds weight. The limestone composing them is snbcrystalline, of a yellow or pinkish colour, and has a conchoidal fractnre. It does not contain any fossil, bnt is donbtless referrible to the upper limestone series; and I have a faint idea of having seen a nummnlite in it, but such a case is rare. The pebbles are of limestone alone, and of one kind. The limestone-paste abounds in nnmmulites, which almost constitute the paste in parts, as at Nurpur, where it also contains mammalian bones, but sparingly: it is in fact one of the upper tertiary series, in many of the lower beds of which nummulites occur, shewing a gradual change from one formation to the other.

No. 11. Upper tertiary ossiferons sands and marls.—This series, if not the most interesting, is one of the most extensive in the range. Ten thousand feet is probably not one-half of its actual thickness;

Section across the Range through Wachera

Scale Vertical 5000 = 1 Inch
" Horizontal 10,000 = 1 In.



for to the north it stretches like a boundless sea, as far as the weary eye can follow, presenting a seemingly interminable succession of sands and marls alternating with the greatest regularity. The following section will convey an idea of the mode of occurrence of the different beds.

Section near Jábbi, ascending order.

	feet.	
Nummulite limestone,		No. 9.
Nummulite sandstone,	40	No. 10.
Red and white marls,	80	No. 11.
Soft greenish sandstone,	90	
Coarse band, (marly and concretionary,)	4	
Fine greenish sandstones,	180	
Green arenaceous marl,	15	
Greenish sandstone with ferruginous spherules,	80	
Coarse band,	3	
Greenish sandstones with 4 coarse bands,	140	
Coarse pebbly band,	15	
Red marl,	15	
Green sandstone with coarse yellowish bands,	80	
Red marl,	10	
Coarse pebbly band,	40	
Red marl,	80	
Coarse and fine arenaceous beds,	70	
Red marl,	90	
Fine sandstone,	60	
Red and white banded marls,	150	
Sands, marls and pebbly bands,		

The sandstones are usually soft and contain a few pebbles. Their colour is mostly greenish, also white, reddish, or grey. The marls are dull red, or red and white banded. The coarse bands are beds of a concretionary marl, resembling a conglomerate, but rarely containing pebbles. Their colour is mostly yellow, or reddish-yellow and brown. Though fossils are found throughout the series, it is only in a few places that they occur at all numerously. Towards the west of the range, the bones found are little better than mere fragments past recognition; but to the east they are not only more numerous, but well preserved. Near Kulla Kahar east of the salt

lake, bones are pretty numerous; entire ribs, the pelvis, teeth, and limb-bones, more or less perfect but very friable, or rather shattered: owing to local disturbance of the soft sandstones. The teeth met with are usually well preserved, and their hardness and consequent preservation together with that of the bones would appear to bear an inverse ratio to that of the matrix. A soft sandstone or marl usually affording the finest fossils. In the very hard bands the bones are often soft and friable in the extreme. The fossils are usually completely mineralized, though very many adhere to the tongue, and this character is observed in the weathered surface of many of the best preserved. A narrow ferruginous band between Rhotás and Tilla, of not many inches in thickness, contains many well preserved specimens: among them I may mention a small but very perfect lower molar of an elephant with the jaw attached. The teeth are mostly those of deer and large pachyderms, and the total absence of all carnivorous remains is a striking feature in the deposit. The remains of tortoises are also very common, sometimes an entire case of one being seen. Near Jalálpur a very perfect one was seen fully three feet in length. The teeth of crocodiles are also very numerous in particular bands, usually of a small size but well preserved and beautifully polished. I also procured part of the upper and lower jaws of one of these animals of a small size near Jalálpur. These last remains are usually found in marly beds, the others in sandstone or marl. I also procured some fine specimens from Lehri N. of Rhotás, though I was unfortunately unable personally to visit the locality.

Another and by no means unimportant group of sandstones occurs in many parts of the range, resting unconformably on the last described ossiferous series and the underlying nummulite limestone where denuded. These beds are locally developed, occurring most extensively in the nulla near Jalálpur, about one mile from the village and behind Nowshera, 12 miles east of Mt. Sakesa. The beds in the first locality consist of very soft argillaceous sandstones, thick-bedded and imperfectly stratified, with thick beds of shingly conglomerate almost entirely made up of nummulite limestone boulders. I may here mention that many beds in the ossiferous series (as at Jalálpur) are conglomerates of nummulite limestone

and red sandstone, identical with that overlying the saliferous marl of the range, which proves that great physical changes must have been going on at no great distance, simultaneously with the deposition of the upper beds of the ossiferous tertiaries, to which portion (the upper) they would appear to belong; as also the thick-bedded conglomerates consisting of boulders of all the harder plutonic and metamorphic rocks, which are seen close under Rhotás fort, and resemble nothing more than huge sheets of mortar, the illusion being increased by the crumbling bastions above, of which they at first sight seem the artificial and veritable foundations. These mortar-like beds are nowhere developed in the range save near Rhotás, but are again met with Trans-Indus behind Kála Bágh; and as such an enormous succession of fine sands and marls is met with in the range, it may fairly be conjectured that these "mortar beds" are confined to, and constitute the upper portion of the ossiferous series, of which they undoubtedly form an integral part as seen near Rhotás. The thickness of the unconformable beds near Jalálpur is not very great, but near Nowshera must range to 3 or 400 feet.

At Jalálpur the tertiaries dip 40° to 50° to the south gradually, becoming vertical on ascending the nulla; the dip then wavers somewhat, though always high, and then gradually declines 40° to 20° north. The upper beds near Jalálpur are conglomerates, then come (descending) red and yellow marls banded with greenish sandstones, then sandstones with some bands of marl, and the lowest beds are a vast number of fine sandstones and pebbly grits, with but little marl. The whole evidently being very high in the series: and this is curious in one respect, as where the beds are vertical, a portion of the true saliferous gypseous marl of the range has become intercalated, simulating an actual bed in the tertiaries. A bed of red sandstone occurs above it, but whether it has also been intercalated, or is a mere accidental variety of a tertiary sandstone, is not easy to decide; since the lower rocks are in close proximity to the tertiaries on either side, and the faulting and disturbance in this part has been very extensive and complicated. In this case a cursory examination would lead to the idea of an actual saliferous marl occurring in the tertiaries, especially as many marls of that series bear a very strong resemblance to the true salt marl; but it is to be

doubted if any tertiary bed is *per se* saliferous, in the ordinary meaning of the term. It is true, many of them become much impregnated with salt, owing to the vicinity of rock salt in the true salt-marl, even where this rock may not be actually exposed; but throughout the vast series of marls exposed in the range, no instance occurs of their yielding a brine which is not plainly derived from the salt marl and rock salt. The tertiary marls yielding brine, as mentioned by Major Vicary and others, must in all probability be so circumstanced; being evidently the same ossiferous series that occurs in the Range, the brine being derived from some deep-seated bed of rock-salt or marl corresponding to the salt-marl of the Range.

The last deposit to be noticed in connection with the range is one of the most recent date. It consists of a confused and mostly unstratified accumulation of debris, forming a fringing talus along the entire south base of the range, not shelving gradually to the plains, but terminating somewhat abruptly in a number of bluffs some 40 feet or so in height, separated at irregular intervals by creeks or inlets, and the whole having evidently once formed a submarine bank, originated in the action of the waves on the crumbling coast-line of the range. It is widest at Pind Dadun Khán, where it is fully three miles broad; one mile, however, may be taken as rather above the average breadth. It consists entirely of debris from the range, and under the hills receives yearly additions by the masses brought down by rain from the hills. From its porosity and dryness, the jungle growing on it is thin and stunted: it forms, however, a valuable grazing tract for camels and other beasts belonging to villagers in the plains.

Having described the stratified rocks of the Range, I may here briefly notice some rocks, which (though not connected with it) are, from their position, not without interest. I allude to the small cluster of hills between the Jhilum and Chináb rivers, called the Karána hills, the most prominent peak of which is 24 miles south south-east (S. S. E.) from the station of Sháhpur, and a little over 40 miles in a direct line from the nearest point in the Salt Range. These hills rise somewhat abruptly from the plains in detached ridges or clumps, the highest scarcely attaining 600 feet. They are composed of a species of slate, the slaty structure being but feebly

developed, and the original planes of stratification with deep ripple markings in places well preserved. The prevailing colour of the slate is gray, stained red and yellowish, and weathering to a dark burnished brown, in which state it presents an intensely ferruginous and burnt aspect, relieved by occasional veins of pure white quartz. These veins occur with no regularity and are rarely of any thickness. Much peroxide of iron is associated with these rocks, and a curious carbonate of lime and iron (vide Mr. Piddington's examination of the ore, J. A. S. Vol. XXII. p. 208), resembling a rich carbonate of iron, but, in reality, rather a carbonate of lime, occurs associated with the quartz veins. One of the largest veins observed was about one foot in thickness, half consisting of pure white quartz, the rest of the curious carbonate of lime and iron examined by Mr. Piddington.

I now come to the consideration of rocks of an igneous character, which, it has been asserted, occur nowhere throughout the Salt Range. Trap however undoubtedly occurs at some few places towards the east end of the range, and in other places signs of a metamorphic action having been exerted on the rocks are pretty plain. On the southern descent of Mt. Tilla, the upper strata are seen much shattered and re-cemented by stalactitic infiltrations, and many beds of shale appear greatly altered and strongly impregnated with iron. This very circumstance may be perhaps rather the cause than the effect, for I need only quote "laterite" as an instance of what singularly deceptive and protean aspects, a rock containing much iron is capable of putting on. The Karána rocks also afford striking instances of that pseudo-slaggy appearance that some ferruginous rocks exhibit, so that perhaps these appearances on Mt. Tilla cannot safely be referred to metamorphic action properly so called. An instance again occurs in the Nilawán ravine below Nurpur, where two beds of sandstone are seen much altered and thrown up at 20° N. N. W., crossing the gorge something in the manner of a low wall. Between them a ferruginous trap rock occurs, which alters and hardens the adjoining rocks to a depth of eighteen inches, and is thus the cause of their standing up like a blackened wall from among the soft unaltered strata. Near Mári also many beds of sandstone appear altered by hot vapours traversing the planes of stratification though to no great extent, the action scarcely affecting more than

the surface. This appearance however should not be confounded with a somewhat similar one also seen in the same beds, and produced by the decomposition of pyrites in the sandstone itself.

I shall now describe an actual trap, which, though far from common, is interesting as a bonâ fide representative of its class. This trap occurs only at the east end of the range and is confined to the red salt-marl, and appears in connection with one of the best marked faults in the range (vide Choa valley section). It occurs in four places, viz.: 1st, On the east side of the Kiura gorge about half a mile above the village. 2nd, On the west shoulder of Mt. Karingli, in a nulla opposite the small village of Chumbi. 3rd, On the N. W. side of the Makraj gorge, above the waterfall. 4th, In the Nilawán ravine below Nurpur, a short distance from the salt choki; and at a few other spots. The colour of this trap is a dull brownish or reddish purple. It is trachytic, and tolerably compact and hard, and is traversed in every direction by short capillary markings (probably, very minute crystals of tremolite), which in perfectly unweathered specimens are occasionaly obsolete.

Although from the nature of that rock, its junction with the red marl is never well seen, yet its action on it is sufficiently well marked. It converts the bright red marl into an orange or cream coloured mass, very vesicular at the immediate point of contact, and containing keruels (as at Nurpur) of a greasy earth, like soapstone, at other places (Kiura) kernels of a glassy zeolite and geodes with crystals of a similar mineral. The vesicles in the marl are usually coated with an impalpable black, red, or yellow powder.

The trap itself changes somewhat in character in contact with the marl, becoming amygdaloidal and otherwise assimilating to that rock. When decomposed, creamy yellow spots become developed in the trap, which gradually enlarge, till the mass becomes converted into a yellowish-white bole, or hard earth traversed in every direction by radiating spiculæ (tremolite?) which seem to exist in a latent form till rendered visible by decomposition.

The gypsum in the vicinity of the trap is rendered coarsely granular and somewhat incoherent. So conclusive is this appearance that IT was one of the arguments on which Dr. Fleming based his theory* of the ERUPTIVE origin of the RED MARL itself, gypseous

* Vide Quarterly Journal Geographical Society, for August, 1853.

as that rock is throughout its length and breadth; the trap, the obvious cause of the local change in the gypsum, being regarded by Dr. Fleming as an "*altered sandstone* or *clay*."

This is the trap, fragments of which are previously described as occurring in the marl. I have only observed them at Kiura, in the ravine between Mr. Wright's house and the Sujwálla mine, and in a breccia of red marl and gypsum near the same place, seemingly produced by the intrusion of the main body of trap in the Kiura gorge.

P. S.—For the following notes I am indebted to the kindness of Dr. Falconer, who took the trouble to examine a small collection of fossils from near Jalalpur and Lehri, the result of which, as here given, being of considerable interest, and going far to establish the identity of the Trans-Indus tertiaries and those of the Salt Range with the far-famed Sewalik beds. Two points are especially curious; the perfectness of single teeth and small bones, and the usually sharp fracture of the larger bones, together with their rather *local* abundance; and the total absence or great scarcity of the remains of carnivorous animals.

"*Notes of some fossils from near Lehri and Jalalpur—Salt Range, Punjab.*

The fossils are for the most part small fragments; the edges are generally sharp, and the most of them are in the ordinary mineral condition of Sewalik-Hill specimens, occuring in a sandstone matrix and impregnated with lime. Some of them adhere to the tongue, besides ivory tusks.

Many of the specimens are, from their fragmentary condition, indeterminable. The following is a rough list of what could readily be made out.

PACHYDERMATA.

Proboscidia.

Elephas.—A plate of a worn molar; species indeterminable, but probably E. Hysudricus.

Mastodon.—2 specimens of molar ridges of the Elaphantoid or *Stegodon* group; species indeterminable.

2 fragments of ivory tusks.

Hippopotamidæ.—Tusks of the lower jaw of a larger size than are usually met with in the Sewalik Hexaprotodon, and resembling more the true Hippopotamus or *Tetraprotodon* of the Nerbudda.

Rhinoceros.—Upper and lower molars in fragments.

Equus.—Upper and lower molars of 2 species.

Sus.—Upper jaw.

RUMINANTIA.

Sivatherium.—Lower jaw (fragment) with tooth.

Bos.—Upper and lower molars and fragments of jaws.

Cervus and Antilope.—Several species, some of them very minute. Abundance of Astralagi, femur ends, and scapula cups, also fragments of deer horns.

Camelus.—Portion of a molar.

AVES.

Fragment of a leg bone with the articular surface, of a large form belonging to the Grallæ.

REPTILIA.

Crocodilus and Leptorhynchus (Gavialis).—Lower jaws and teeth with vertebræ.

Trionyx.—Fragment of the carapace with vertebræ of a large species.

Fish.—A vertebra.

MOLLUSCA.

A few lime casts of one of the species found in the Sewalik Hills.

There are in the collection a number of indeterminable fragments of other bones.

The characters of the collection are entirely those of the Sewalik Hills Fauna as usually met with; with the single exception of the Hippopotamus tusk.

There was in the collection one piece of Endogenous fossil wood resembling the Irrawaddy specimens, found so abundantly near and above Prome.

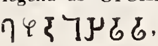
H. F.

Calcutta, 12th September, 1854.

Coins of Indian Buddhist Satraps, with Greek inscriptions.—By Major A. Cunningham, *Bengal Engineers.*

Of the numerous coins bearing Greek legends which, during the last twenty years, have been found in Cabul and the Punjab, the greater number belong to the series of pure Greek princes, who ruled over the Indian provinces of Alexander the Great. The remainder belong to their Scythian conquerors; to Hyrkodes and Kadaphes; to Moas and Azas; to Barano, Hoerke and Kanerki; and to their Indo-Parthian contemporaries, to Vonones and his brother Spalhores, and to Gondophares, his brother Orthagnes,* and his nephew Abdagases.

Amongst all these coins, certainly not less than thirty thousand in number, and which range over a period of more than three centuries, not a single specimen has hitherto been found bearing a pure Hindu name in Greek characters. And yet in the Punjab at least we might have expected to have found some remains of a partially Hellenized currency of the descendants of Taxiles and Porus. Of the great competitor of Alexander, we only know that he was a descendant of Gegasios,† or *Jajáti*, which proves that he was of the

* The coins of this chief are extremely rare. His name occurs only in the Greek legend as ΟΡΘΑΓΝΗC, or ΟΡΘΑΓΝ; but in the Pali legend he styles himself  , *Gondophara Sagaba*, "the full brother of Gondophares." *Sagabha* is the Pali form of the Sanskrit सगर्भ्य, *Sagarbhya* "of the same womb," which is now represented by the Hindi *Saga-bhai*. Abdagases calls himself the *bháta-putra*, or brother's son" of Gondophares. The coins of Vonones always present the name of his brother on the reverse—thus: *Maharaja-bhrala dhamiasa Spalahorasa*, "(Coin) of the king's brother, the just Spalhores."

† This fact is preserved by Plutarch, de Fluviis, in voce Hydaspes. When Porus was assembling his troops to oppose Alexander, the royal elephant rushed up a hill sacred to the sun (the present *Bálnáth-ki-Tila* or "hill of the sun god)," and in human accents exclaimed "O great king, who art descended from Gégasios, forbear all opposition to Alexander, for Gégasios himself was also of the race of Jove." The hill was afterwards called "the hill of the elephant," which I take to be another proof of its identity with Bálnáth; for this name is in most of our maps written *Bilnaut*, and is commonly pronounced *Bilnáth* or *Belnáth*, which I suppose the Macedonians, who had just come through Persia, to have mistaken for *Fil-náth* or *Pil-náth*—the elephant. See Hodgson, Geography, Vet. Vol. II.

lunar race of Hindu princes, and strengthens to a certainty the belief that has generally prevailed amongst Sanskrit scholars, that Porus was not the individual name of the king, but that of his race, as a *Paurava* or descendant of *Puru*. In the spoken language the patronymic is pronounced *Paurav* and *Pauru*, which with the Greeks, became Πῶρος.

The great Porus himself was treacherously murdered by the Greek governor of the Punjab after the death of Alexander, but nothing is recorded of his descendants or of those of his cousin, the second Porus. We know only that as the whole of the Punjab was subjected by Chandra Gupta Maurya, the royal Pauravas must of course have become his tributaries. Some orientalists still affect to doubt the identity of Chandra Gupta and Sandrakoptos, which, though at first only a happy guess of Sir William Jones, was afterwards all but actually proved by the researches of Professor Wilson, who showed that the same private scandal was related of Saudrakoptos by the Greeks, as of Chandra Gupta by the Hindus. I will now add my mite towards settliug this important point which is the very corner stone of ancient Indian chronology. Euphorion,* who became the librarian of Antiochus the Great in 221 B. C. states that the

Μωριεῖς, ἔθνος ἰνδικὸν, ἐν ξυλίνοις οἰκοῦντες οἴκοις

"the Indiau *Morias* live in wooden houses;" to which Hesychius adds

Μωριεῖς, οἱ τῶν ἰνδῶν βασιλεῖς.

These *royal Morias*, who dwelt in wooden houses, must therefore be the same regal *Mauryas*, who lived in the wooden palaces of Pátaliputra or Palibothra.†

During the reigns of Chandra Gupta and of his successors Bimbisara and the great Asoka the province of Taxila was only a depeudency of the vast Indian empire of the Mauryas, the governorship being generally held by one of the king's sons. But after the

* Stephanus Byzantinus, in v. Μωριεῖς.

† Nearchus, in Arrian's Indica c. x. says that the Indian cities that were situated on rivers, were built of wood. The bas-reliefs of the Sanchi tope, which were sculptured in the reign of Sátakarni, about A. D. 20, represent palaces of wood with the rafters in perspective.

decline of the Manryan dynasty, and during the decay of the petty Greek kingdoms of Cabul and the Panjab, it might have been expected that some scion of the royal house of Purn, some second Porus, would have asserted his independence; or that some more daring native adventurer; some ancient Ranjit Singh, would have carved out a kingdom for himself. Some traces of such events may perhaps be seen in the frequent changes of the Indian dynasties of Delhi and Magadha just before the Christian era, as recorded in the Rájavali and in the Puránas.* This re-assertion of native power and influence may also, I think, be seen in the coins of the accompanying plate, which bear the unmistakeable Hindu names of *Mahigula*, *Jivanisa*, and *Rájabála*.

The corrupt style of the Greek letters and the types, which are imitated from those of Azas and of the later Greek kings, show that these satrap coins must belong to the first century before the Christian era. Now at this very time, the throne of Delhi was occupied by the *Mayúra* family, said to be of lunar descent, amongst whom, there occur three princes, whose names differ so little from those of our coins as almost to warrant the conclusion that they are the same. This conclusion is, I think, much strengthened by the prevailing mint mark on the coins of *Rájabála*. It consists of two Pali letters, ⊏| S, forming the word *Hasti* which I take to be the numismatic contraction for *Hastinapura* on the Ganges, the celebrated ancient capital of the lunar race. It is true that these letters might also stand for *Hastinagara*, the city of Astes, prince of Penkelaotis and the Hashtnagar of the present day. But this is not borne out by the places where the coins have been discovered. Of *Zeiónisos*, or *Jivanisa*, only four coins have yet been found, all of which were procured in the Punjab. My two specimens came from Kashmir and Ráwal Pindi. Of *Rájabála* not a single specimen, to my knowledge, has been found to the west of the Chenáb. My own coins were obtained at Amritsur, Lahore, Harapa, Shorkot, Tulamba, Kahror, and Multan, all in the Eastern Punjab; and at Delhi and Mathura on the Jumna. The greatest number were procured at the last place, and were said to have been found in the ruins of the city, along with some rude hemidrachmas of Strato.

* See Prinsep's Useful Tables—pp. 98—100.

We have thus the additional evidence of time and place in favour of the identification of these Hindu satraps with their namesakes of the last lunar dynasty of Delhi.

This dynasty is of some importance in Indian history, as the last prince, *Rájapála*, was vanquished by *Sákáditya*, or Sakwanti, the chief of the Sákas, or Indo-Scythians, who was himself overcome by the celebrated Vikramaditya, in the year $56\frac{3}{4}$ B. C. On this victory, the conqueror assumed the title of *Sákári* or "foe of the Sakas," and from it, the Hindus have dated one of their principal eras, the Vikramaditya Sambat, which is still in use.

The names of the princes of the Maynra dynasty of Delhi are given by Tod* from the Rájávali, by James Prinsep† from Tod, and by Ward‡ from the bráhmans of Bengal. As these lists differ from each other, and from a third in my own possession, which was obtained from a learned purohit in the Punjab, I think it is highly probable that all three are more or less faulty in the spelling of the names, of which the true orthography may have been preserved by the coins. In Prinsep's list, which is copied from Tod, the name of the founder of the dynasty has been omitted by mistake; and the two names immediately preceding his last are formed by the division of the penultimate name of our lists, and our fourth name is omitted altogether, probably owing to its similarity with the preceding one. But there is still so close an agreement in the names of the three lists, as to warrant our confidence in their general accuracy. I now give the different lists with the probable date of the accession of each prince.

Mayura Dynasty of Delhi.

	Ward.	*Tod, Prinsep.*	*Cunningham.*
B. C. 230	Dhurandhara	Dhudsen	Yonadhara.
210	Senodhata	Senadhwaja	Senadhwaja.
190	Mahákataka	Mahaganga	Mahiganga.
170	Mahayodha	(Caret)	Mahajodh.
150	Nátha	Náda	Sarma.
130	Jivana-rája	Jewana	Jivan-siráj.

* Tod's Rájasthan, vol. I. Table II. and page 51.

† Useful Tables, p. 98.

‡ Ward's Hindus, 8vo., vol. I. p. 24.

110	Udaya-Sena	Udiya	Umed-sen.
90	Vindhachala	{ Jehala / Ananda }	Anandajala.
70	Rájapála	Rájapála	Rájapála.

60 Delhi taken by Sákáditya or Sakwanti.

57 Ditto retaken by Vikramaditya Sákári.

Several of the facts regarding this dynasty, which are recorded in the Rájávali, are also mentioned by Ferishta, but the names are much changed and misplaced. The general agreement of the incidents however, is curious, as Ferishta wrote his history in the south of India just one hundred years before the compilation of the Rájávali by the order of Siwai Jay Singh of Amber. But the Mahomedan historian has a still more striking coincidence with a statement of Polybius, which has been already noticed by James Prinsep,* who supposed that Ferishta's information was derived "not from the Greeks, but from native authorities now no longer extant." These two statements, which refer to the same period of history, are so exactly alike, and so precise in their language, as to leave no doubt in my mind that they refer to the same person, although the names are different. I will now place the two passages side by side in translations given by authors who were not aware of the coincidence.

Polybius.

"Passing Mount Caucasus he (Antiochus) came into India and renewed his alliance with Sophagasenus, the Indian prince. In this place he obtained more elephants so that his whole number was now a hundred and fifty."—*Hampton.*†

Ferishta.

"He (Jona) was contemporary with Ardshir Babegán, who invaded India; but being met by Jona with valuable presents of gold and elephants on the frontier, Ardshir was induced to withdraw his army."—*Briggs.*‡

In both of these passages, we have the same story of the invasion

* See Journ. As. Soc. Bengal, 1838, p. 163.

† Hampton's Polybius, 510.—See 1, XI. page 8.—Ὑπερβαλών δε τον καύκασον, και κατάρας εἰς την ἰνδικὴν, την του φιλίαν ἀνενεώσατο την προς Σοφαγασῆνον τον βασιλέα των ἰνδῶν, και λαβών ἐλέφαντας, ὥστε γενέσθαι τους ἅπαντας εις ἑκατόν και πεντήκοντα.

‡ Brigg's Ferishta, vol. I. p. lxxiv.

of India by the king of Persia, and of the invader's retirement on receiving a number of elephants from the king of India.* The period at which these invasions took place is also the same, as I will now show. The Greek historian is relating the Indian expedition of Antiochus the Great, which Bayer and others have agreed to fix in B. C. 205. On this occasion, he renewed his alliance with the Indian king. At what time, his original alliance took place is not mentioned, but we may fix it with great probability in B. C. 220, at the close of his first eastern expedition. From 220 to 212 B. C. Antiochus was fully employed in his wars with Ptolemy, and his second eastern expedition lasted from 212 to 205 B. C. The reign of the Indian king may therefore be supposed to have commenced at least as early as that of Antiochus himself, or in B. C. 224.

The Mahomedan historian calls the king of Persia, Ardshir Babegán, which is an evident mistake, as this is the well known name of the founder of the Sassanian dynasty in 226 A. D. I would read Artabán, for Arsaces, 3rd Artabanus, who reigned from B. C. 216 to 196, and was therefore a contemporary of Antiochus the Great, and his Indian ally Sophagasenus. In favour of the correctness of this alteration, we have Ferishta's previous mention of *Gudarz* and *Tirasi*† as the kings of Persia to whom Jona's predecessors had paid tribute. The latter name I would correct to پرسي *Pirasi*, and thus identify the two kings with Gotarzes and Volageses 1st.‡ It is true that the dates of these two princes are much too late for the period of Jona: but it must be remembered that Ferishta had access only to the Persian historians, according to whom *Gudarz* and *Volas* are the fourth and fifth princes of the Ashkanian dynasty. There is an acknowledged confusion in these Persian accounts between Ashkanians and Ashganians; but Gudarz and his son Volas, the fourth and fifth princes of the former dynasty, are evidently those to whom Ferishta alludes. The Greek and Roman

* In the original of Ferishta, I find the word "jewels" added to the other gifts which General Briggs has omitted in his translation; و زر و جواهر بسیار و فیلان "gold and many jewels and elephants."

† کود رز و ترسي — *Gudarz wa Tirasi.*

‡ *Tirasi* may however, as Jas. Prinsep suggested, be only a Persian form of Tiridates.

historians also differ amongst themselves; but the commonly received account related that Arsaces, the founder, was succeeded by his brother Tiridates, who was succeeded by his son Artabanus. By omitting the second Ashk of the Persians, who is not mentioned by the western authors, the two accounts will correspond exactly as to relationship, although not in names. Gudarz and his son Pirasi will thus become the third and fourth princes of the dynasty, and be identified with Artabanes and his son Priapatius, who together occupied the Parthian throne from B. C. 216 to 190.

Regarding the date of Jona we have in all the copies of Ferishta the uniform term of seventy years assigned to Sansárchand alone, or to himself and family. If we place the accession of Sansárchand or Sandrakottos in B. C. 312, we shall obtain B. C. 242 for the accession of the Jona Rája of Ferishta; and as he is said to have reigned ninety years from B. C. 242 to 152, he was a contemporary of Antiochus the Great, during the whole period of his reign.

On referring to my list of the Mayúra dynasty of Delhi, it will be seen that the founder is named *Yavana-dhara* or rather *Yona-dhara*, یوندهر which is the same name as *Yona* or *Jona*. The date which I have assigned to him from B. C. 230 to 210 is not an arbitrary one, but is based upon the interval elapsed between the great war and the victory of Vikramaditya. In Tod's and Ward's lists, the number of princes from Parikshita the son of Arjuna to Rajapala is sixty-six: in my list, the number is sixty-eight. Now allowing an average of twenty years to each reign, the accession of Parikhshita will be placed in 1397 B. C., a date which agrees exactly with the close of the great war.*

Regarding the various names of the founder of this dynasty we may rest satisfied with the explanation given us by Strabo, that it was customary for the princes of this period to have two or three

* Colebrooke and Davis, 1391 B. C. from observations of the equinoctial colures recorded by Parásara—Wilford, 1367 B. C. from independent observations—Wilson, 1430 B. C. The mean of these is 1395 B. C. The date of 1180 B. C., which Jas. Prinsep was inclined to adopt on account of its near coincidence with B. C. 1176, the epoch of Paras-sur-áma whose era is still in use, was the *first* calculation of Davis and Colebrooke. Their *corrected* calculation was the earlier date which I have given.

names. Thus Chandra-Gupta had a birth name, which is not mentioned; a local name, *Palibothres*, or lord of *Palibothra*, and a royal name, *Sandrakottos*, which he assumed on his accession to the throne.*

The Greek name of Σοφαγασηνος is most probably the Sanskrit सुभागसेन, *Saubhágasena*, or chief of the fortunate army, that is, the victorious leader. *Yavanadhara* means the "keeper of Greeks," or the retainer of Greek troops; and *Durandhara* means the "possessor of good qualities" or the "possessor of wealth." Both of these are royal titles which may be compared with those of the Arsacidæ of the same period, Philhellenos and Evergetes. *Saubhágasena* and *Yavanadhara* may be considered as varieties of the same title as the leader of a body of Greeks would of course have been the chief of a fortunate or victorious army. The name of *Dhudsen*, which is given by Tod, appears to me to be the common colloquial corruption of *Dhursen*, the chief of a good army, which may also be considered as synonymous with Saubhágasena.

Now it is curious that all these names refer to the military character of the chief, which is also ascribed to the founder of the *Mayúra* dynasty in the Rájávali. Ward calls him simply the minister, but both Tod's list and mine more correctly state him to have been the "military minister" of his predecessor. Ferishta mentions that he was the nephew, خواهر زادہ, *Khwáhár-záda*, the "sister's son" of *Fúr*, the antagonist of Alexander: but I suspect that he may have mistaken the family name of مور *múr* (Mora, Maurya or Mayura) for فور *Fúr*. This seems to be the more probable as my list mentions that the throne which he obtained had formerly belonged to his ancestors. It is possible therefore, that *Durandhara*, the "possessor of wealth," or of "good qualities," may be the same as the prince *Sampadi* the "increase of wealth," or of good qualities, who was the son of Kunála, and the grandson of Asoka Maurya.†

There is one other fact about *Jona* which must not be omitted. According to Ferishta, he is said to have been a liberal prince, who

* Megasthenes in Strabon, XV. Similarly we have Omphis and Taxiles; the former being most likely the real name, the latter certainly the local one, as lord of Taxila.

† Burnouf-Bhuddhisme Indien, p. 430.

patronised the arts and founded many cities on the Ganges and Jumna.

Of his immediate successors, *Senadhwaja* and *Mahúganga*, I have nothing to say; but the fourth prince *Mahúyodha* or *Mahi-jodh*, whose name is unfortunately missing in Tod's list, is most probably the same as the *Mahigul* of the coins. The sixth prince *Jivana*, or *Jivansiráj*, is, I have little doubt, the *Jivanisa*, or Ζειωνισος, of the coins; and the last prince *Rájapála* is, I think almost certainly, the same as the *Rája-bála*, or Ραζιο βαλος of the coins. In Ward's account it is stated that *Rája-pála* having given himself up "to effeminate amusements, his country was invaded by *Sákáditya* king of Kumaon who proved victorious and ascended the throne."* In my list it is added that *Sákáditya* was invited by *Rájapála's* minister. Tod has made a jumble of this simple statement by confounding *Sákáditya* the "chief of the Sákas," with Vikramáditya, the *Sákári* or "foe of the Sákas."

In all these accounts the successful conqueror of Delhi is called lord of the mountains of Kumaon. Even in Ferishta we find *Fúr*, the antagonist of Alexander, styled "king of Kumaon." The Sanskrit name is *Kúrmmávan*, or *Kúrmmáchal*, which is a synonyme of *Himáchal;* but as *Kúrmma* is the same as *Kachchhapa*, कच्छप, a tortoise, we may identify *Kúrmmachál* with *Kachchhwáchal*, and the kingdom of Kumaon with that of *Khache* or Kashmir which in the time of the Indo-Scythians, or Sákas certainly comprised all the mountains of the Panjab then inhabited by *Khasas.* In proof of this, I need only mention that the Mongol author Sanangsetsen calls Kanishka the king of Gache; and that in an inscription, still existing in the Indreswari temple at Kangra, mention is made of the *Gachchhé-ráj* or kingdom of Gaché.† These facts are, I think, sufficient to prove that Sákáditya was not the petty chief of the Kumaon hills, but the great king of the Indo-Scythians as his

* Ward's Hindus, I. 24.

† It is possible however, that *Gache* or *Gachu* was only the name of Kanishka's original kingdom of *Kie-chi* between Balkh and Bamian. The name is still preserved in *Ghaznigak* (the *Ghaznik* of Taimur) near the old fort and caves of Semengán, or Haíbak as it is now called. The great Scythian may still have retained the title of king of *Gache* after all his conquests.

name imports, and whom we know to have been in possession of the Panjab at this very period.

I will now describe the coins and inscriptions which I have collected together in the accompanying Plate. They are of the highest interest and value for the elucidation of Indian history just before the Christian era; as they afford a sure guide to the religious and political state of India at that particular period.

Coins of Jivanisa.

Fig. 1—Round silver didrachma, unique. Jas. Prinsep. Journal As. Soc. vol. V. Pl. XXXV., fig. 5. R. Rochette. Journal des Savants 1839, p. 102—Prof. Wilson, Ariana Antiqua Pl. VIII. fig. 17—p. 312.

Obverse. The king on horseback. In front the Buddhist Monogram of Dharma. Greek legend, only partially legible.

Reverse. The king, clad in the Indian *dhoti*, standing to the front. On each side of the king is a Victory engaged in crowning him with her right hand. Ariano Pali legend incomplete: *Mahigu* (*la Cha*) *trapasa Jivonisasa.* This coin, which was in General Court's collection was assigned doubtfully to Mauag by R. Rochette, who thought that he could trace the words ΜΕΓΑΛΟΥ ΜΑΥΟΥ: but he admitted that the correctness of this reading would depend on the decipherment of the native legend. From Jas. Prinsep's etching, which was copied from General Court's sketch, I was inclined to assigu this coin to Artemidorus, of whom I obtained a coin in 1848. But its true attribution has been finally settled by the following coin which bears exactly the same legends in a much more perfect state.

Fig. 2. Round silver Hemidrachma, unique. E. C. Bailey, Esq. Panjab, 35 grains.

Obverse. The Raja on horseback: the Buddhist monogram of Dharma in front. Greek legend in corrupt characters.

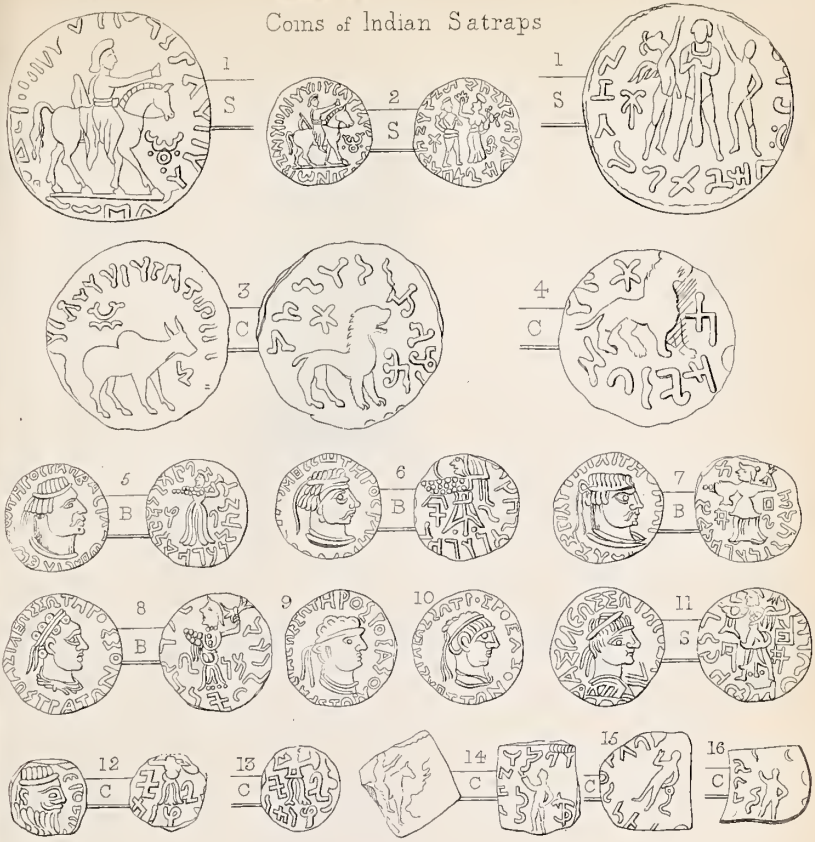
ΟΝΝΠΑΙΥ ΥΠΥϹΑΤΡΑΠ . . Ζ Є ΙΩΝΙϹΟΥ

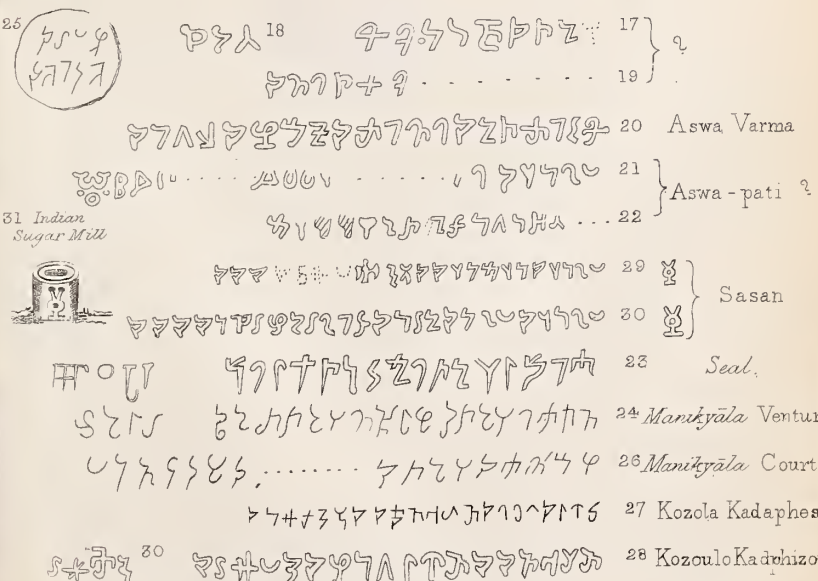
or, ΟΓΓΥΑΟΥ ΥΙΟΥ ΣΑΤΡΑΠ *ον* ΖΕΙΩΝΙΣΟΥ.

(Coin) of Mahigul's son, the Satrap Zeiónisos.*

* I consider this name to be the same as the Greek Διονυσος, as both terms are simple renderings of *Jivanisa*, the "lord of life." In India this was a title of the procreative Mahadeva. In this form of the reproducer, the youthful Ιακχος was

Coins of Indian Satraps

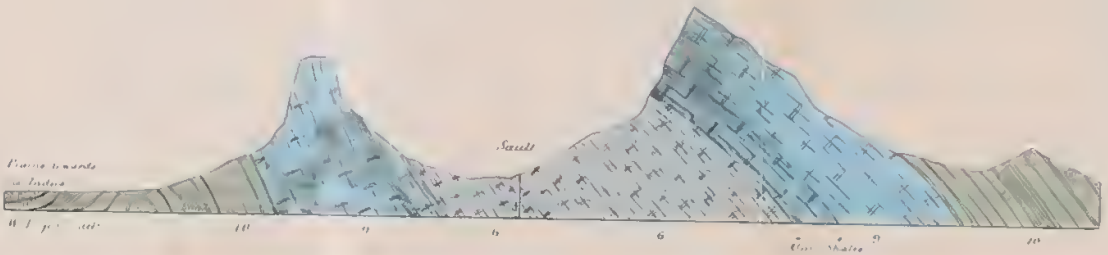




Estimated Vertical Sections showing the great development of some Strata to the West

Pl. 2.

Inverted strata in the
Chichali Pass West of the Indus



Reverse. Demeter, or the Indian *Ardokhro,* with a cornucopia in her left hand, and a wreath in her right, with which she is crowning the Rája who is standing before her. Ariano-Pali legend "*Mahigulasa Chatrapasa-putrasa Chatrapasa Jivanisa*" (coin) of the Satrap Mahigul's son, the Satrap Jivanisa.

Fig. 3. Round copper coin weighing 167 grains, procured at Kashmir.

Fig. 4. Ditto round copper coin similar to the last, procured at Rawal Pindi.

Both of these coins are in my own possession; and I am not aware of the existence of any other specimens. No. 4 has the name perfect which is wanting on No. 3.

Obverse. Humped Indian Bull: Buddhist monogram of Dharma; corrupted Greek legend as on Nos. 1 and 2.

Reverse. The *Singha,* or maneless Indian lion. Ariano-Pali legend as on Nos. 1 and 2.

The types of the horseman on the silver coins, and of the bull and lion on the copper coins, all show that *Jivanisa* cannot be dated earlier than the reign of Azas, from whose coins they are evidently copied. Prof. Lassen assigns the reign of Azas to B. C. 116-90 and my own chronology to B. C. 110-90, both of which periods correspond with the approximate date of *Jivana* given with my table a few pages back. The prominence of the monogram of Dharma on all his coins proves that Jivana was a Buddhist and his imitation of the types of Azas indicates that he was most probably the satrap or tributary of that prince.

Coins of Rájabála.

Fig. 5.—Round billon hemidrachma, weighing 37 grains; one of three in my own possession.

the same as the phallic Hermes, and the four-faced Indian Brahma. In fact the supreme Mahadeva in his threefold form of Brahma, Vishnu, and Siva, is the same god as Dionysos the Demiurgus. Schlegel and Keightley have denied the Indian origin of Dionysos; but in my opinion there is nothing more certain; and I hope hereafter to be able to establish my opinion. At present I will content myself with referring to the gem bearing the words NAMA ΣΕΒΕΣΙΟΝ which is pure Sanskrit signifying "glory to *Sabazios,*" a well known title of Dionysos. See also Ausonius—Epiqr. xxx. "Dionyson Indi existimant."

Obverse. Diademed bust of the king in bold but rude style. Greek legend in late characters, incomplete on all.

BACIAEI BACIAEƆC CƆTHPoC PAZ

which may be corrected and completed thus:

ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΣΩΤΗΡΟΣ ΡΑΖ*ωβαλου*.

Reverse. Rude figure of Minerva Promachos. In the field two letters forming *Aga*. Ariano Pali legend quite perfect.

Chatrapasa apratihatachakrasa Rájabálasa.

"(Coin) of the Satrap Rajabala, invincible with the discus."*

Fig. 6. One of four billon hemidrachmas in my own possession, weighing 36 grains. These specimens differ from fig. 5 chiefly in being of ruder execution: but one of them has the Greek name extended to PAZIOBA; and all of them have the native title shortened to *Apratichakrasa*, which has exactly the same meaning as the other. In the field of the reverse are the letters *Hasti* which I refer to Hastinapura, the old lunar capital on the Ganges.

Fig. 7.—This is one of several billon specimens in my own possession, weighing 36 grains. The head is of still ruder workmanship and is quite flat at top. The native legend and monogram are the same; but the Greek legend differs entirely. From a comparison of eleven specimens it appears to be

ΛΣΙΛ or ΣΥΙΛ ΠΟΗΣ ΙΥΙΡΟ ΡΙΣΙΟ ΣΤΡΑΤΙΥΣ

from which I make out conjecturally,

ΒΑΣΙΔ*εως* ΣΩΤΗΡ*ος* ΡΙΣΙΟ*βαλου* ΣΤΡΑΤΩΝΟΣ.

This connection of the names of the Hiudu princes Rájabál, "the invincible with the discus," and of the Greek king Strato, might justly have been disputed if these corrupt legends had been the

* In Hindu mythology the discus, or quoit, is the favorite weapon of Vishnu; but it is now used only by the *Akális*, or Sikh fanatics of the Punjab. Philostratus, Life of Apollonius, c. 27, relates that the king of Taxila in A. D. 45, "sometimes exercised himself with the *disc* and Javelin, after the Greek fashion." In ancient times it would seem to have been in common use amongst the Greeks, as Homer relates that while Achilles sulked in his tent,

> On ocean's shore his soldiers hurled the quoit,
> Or twanged the bow, or sped the quivering lance.
> ——— λαοὶ δὲ παρὰ ῥηγμῖνι θαλάσσης
> δίσκοισιν τέρποντο καὶ αἰγανέῃσιν ἱέντες,
> τόξοισίν θ'· Iliad. II. 773.

only evidences of it. But I possess some very rude coins of Strato, which were found in company with the others and which were evidently the prototypes of these coins of Rájábála. Three of these pieces are engraved in the accompanying plate. They were found along with the coins of Rájábál in a ruined mound at Mathura. Their weight ranges from 36 to 37 grains.

Fig. 8. Shows the decline of Greek art, but the legends are still perfect. The Greek legend is ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΣΤΡΑΤΩΝΟΣ. The native legend is *Máharájasa trádatasa Stratasa*, which is a literal translation of the Greek. The other coins are still ruder, and their Greek legends have become corrupt, although their native legends remain perfect.

Fig. 9. ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

Fig. 10. ΒΑΣΙΛΕΩΣ ΣΩΤΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

As the native legends of these coins preserve the names and titles of Strato quite perfect, I can only conclude that the latter half of the Greek legend has been jumbled by the engraver of the die, and that the word ΡΟΣΑ has been formed by repeating the last three letters of ΣΩΤΗΡΟΣ, to fill up the blank left by the omission of the three letters, ΤΡΑ, of the name. If this conjecture is admitted the corrupted Greek legend of Rájabála's own coin, *Figs.* 7, may perhaps be explained in the same way.

I do not think that the issue of these rude coins can be attributed to Strato himself; but rather to the native princes who afterwards succeeded to his power. The gradual decline of the style of workmanship, and the corruptness of the Greek legends shewn in Figs. 8, 9, 10, make this conjecture the more probable. It is still further strengthened by the known facts of the want of a silver coinage amongst Indo-Scythians, and of the consequent currency of the drachmas of Menander and Apollodotus even to so late a period as the second century of the Christian era.*

* The following instances of the continuance of a sovereign's coinage long after his death may be worthy of notice. Feroz Toghlak died in A. H. 790; yet we possess coins bearing his name dated up to A. H. 828. Husen Shah Sherki, of Jaunpore, was dethroned in A. H. 883, and died in 905, yet his coins may be obtained in a perfect series up to 918. Lastly Shah Alam of Delhi died in 1806; but the issue of coinage was continued in his name by the East India Company,

Another Greek prince whose coinage was re-issued and perhaps imitated by the native chiefs in their own names was Zoïlus. *Fig.* 11, is a rude silver hemidrachma of this king, which was obtained in the Punjab. It is of the same type and of the same barbarous style as the coins of Strato and Rájabála, and it bears the same Ariano Pali mint-mark of two letters forming *Hasti*, which we find on the commonest coins of Rájabála.

Besides the coins which I have already described I possess five copper specimens bearing the name of Rájabála. They are of the same size, type, and style as the billon coins, and appear to me to have the traces of silver plating upon them. I do not therefore, consider them as a true copper coinage but as the base silver currency of the Punjab portion of Rájabál's dominions, in which they are now found. They bear different mint-marks from the billon coins but the legends are the same, with exception of the title which exalts the chief to a *Maháchatrapa* or "great satrap."

I have already identified the satrap Rájabála with Rájapála the last of the Mayúra kings of Delhi, who was conquered by Sákáditya, the chief of the Sákas or Indo-Scythians, who was himself overcome by Vikramáditya in 57 B. C. That this is the true date of these coins is rendered almost certain by the discovery of similar coins of a still ruder style, and therefore of a later period, which bear the name of Gondophares. Two of these coins are engraved as *Figs.* 12 and 13. The Greek legend is corrupt, and I cannot decipher more than the word BACIAϹIC but the Ariano Pali legend, which is not perfect on any one specimen, may easily be completed by a comparison of them all. It is the same as the simple legend which is found on the larger coins of this prince, *Máharájasa trádatasa Gondopharasa.* I have found most of these coins in the Punjab as far south as Multan, but a few specimens were procured to the eastward of the Sutlej.

The Satraps whose coins have already been described have been identified with the Hindu Princes of Delhi on the joint evidence of their similarity of names, of their contemporaneous sovereignty,

for nearly thirty years; and this coinage is still generally current after a lapse of forty-eight years.

and of the places of discovery of their coins being within the probable limits of the ancient kingdom of Delhi. The satrap coins and inscriptions, which yet remain to be described, have been found only in the western Punjab, excepting a few rare specimens from Jelalabad and Peshawur. The metropolis of this western Satrapy I would fix at Taxila, near Manikyála, where two inscriptions have been found which contain the names of three different satraps. Delhi and Taxila may therefore be considered as the eastern and western satrapies of the Indian portion of the great empire of the Indo-Scythians. Between these extreme points lay the satrapy or principality of *Cheka*, the ancient *Sákála*, which stretched from the *Pi-po-she* (the Vipása or Byas) on the east, to the *Sin-thu* (the Sindhu or Indus) on the west, and from the foot of the Rajaori hills to the confluence of the Punjab rivers.* The Buddhists have celebrated the conversion of Milindu Rája of Sákala by their great teacher Nágárjuna, shortly after the commencement of the Christian era. Another king of She-ko-lo or Sákala is mentioned by Hwan Thsang as having reigned several hundred years before his time. This king he calls *Ma-yi-lo-kiu-lo*, who may possibly be the same as the *Mahigula* of our coins. Hwan Thsang travelled in India from A. D. 629 to 645. If therefore to 640 we add 150 B. C., the approximate date of Mahigula, we obtain 790 years as a fair measure of the vague statement of the Chinese traveller.

The Chinese name is spelt *Mo-hi-lo-kiu-lo* by Stanislas Julien,† who renders it most correctly by the Sanksrit *Mahirakula*. This may indeed be the true name on the coins, for the first two syllables of the name are found only on Mr. Bayley's specimen, and I read them at first as Mani. But we are not yet sufficiently conversant with the compounds of the Ariano Pali alphabet to pronounce positively that the letter *r* when preceding a consonant was omitted.

* The northern boundary of Cheka was only two days' journey from Rájaori, that is the foot of the Punjab hills. While to the south Cheka possessed the dependency of *Meu-lo-sau-pu-lo*, or Multan. It therefore comprised all the *plains* of the Punjab, while the hilly districts were subject to Cashmere. The *Cheka* of A. D. 650 had in fact the same limits as the kingdom of Lahore in A. D. 1050.

† See Histoire de la vie de Hiouen Thsang, p. 459; and also Fo-kwe-ki, Appendice, p. 381.

In the words *dharma* and *varma*, as I will presently show, it was certainly used occasionally, although the former word is more frequently found in its Pali form of *Dhama*. But notwithstanding this uncertainty, I think there is a sufficient similarity in the names, and a sufficient approximation in the dates and countries of *Mahirakula* and *Mahigula*, to warrant a strong probability of their identity.

In describing the coins of the eastern satraps Jivanisa and Rájábála, we have had the valuable, although perhaps not quite authentic, aid of a few historical notices of the dynasty to which they belonged. But in describing the coins and inscriptions of the western satraps of Taxila, we must trust entirely to our own sagacity in making deductions more or less probable from the few ascertained facts. The fact that Taxila was tributary and not independent, is not solely derived from the coins, but is positively affirmed by Hwan Thsang, who states that in his time the royal race had become extinct, and that the country was then subject to the kingdom of Kashmir, although it had formerly been a dependency of the kingdom of Kapisa,* that is of the Turki empire of Kabul. The coins belong to three different princes and are of different sizes and different types, but they are such evident copies of the commoner types of Azas, that there can be no hesitation in assigning them to the close of his long reign, that is to about B. C. 100 or a little later. One of these three princes, named *Aswavarma*, was certainly a tributary of the great Scythian prince, as we find the name of Azas, the "great king of kings," always occupying the Greek side of his coins. I will now describe the few specimens of the coinage of these western satraps, which have come to my notice.

Figs. 14, 15, 16. Small square copper coins, weighing 38 grains. The first is in my own possession; the second is from my unpublished plates of Bactrian coins, and the third is from Jas. Prinsep's Journal. These, with a fourth specimen, were all procured in the Punjab.

Obverse. Horseman copied from the coins of Azas: Greek legend, illegible.

Reverse. Male figure with right hand raised towards his head. The Ariano Pali legend is not complete on any of the specimens,

* Stan. Julien, Histoire de la vie de Hiouen Thsang, p. 449.

but the title of *chatrapasa* is distinct on all of them. From its position in the middle of the legend, I conclude that the inscription begins with the name of the satrap's father on the right, and ends with his own name immediately beneath the standing figure. On fig. 15, the name reads invertedly *Mahava*, perhaps *Mahavarma*, but other and better preserved specimens must be obtained before we can decide upon the actual name of the satrap.

Figs. 17, 18, 19. Square copper coin of middle size—Ariana Antiqua, Pl. VIII. fig. 2, p. 331: from a coin belonging to Dr. Swiney. One specimen in Lady Sale's collection; three specimens in Mr. Bayley's cabinet, and one stolen from me in 1844. Of all these six specimens, I have sketches now before me.

Obverse. Horseman as on the coins of Azas. Greek legend, corrupt and incomplete on all the specimens.

Dr. Swiney,.....YOΠ...PA.....EIϹAT.

Lady Sale, PTAYOT .....

Mr. Bayley, PAYOIY-ATAHϹ-EIϹ.....

Author,..... XAPATIШA .....

Mr. Bayley, ...PIAIШ.....

Reverse. Maneless Indian Lion; Ariano Pali legend doubtful beginning on all the specimens with *trapasa*, which may be satisfactorily completed to *chatrapasa* by prefixing a single letter. The whole may perhaps be read as follows:

(cha) trapasa Bhrahata Opha—aspasa putrasa.

"(Coin) of the satrap Phrahates the son of ———."

On comparing the Greek fragments with the Ariano Pali legend the Greek name may be read conjecturally as ΦPATAHE, or ΦAPATAHE, which would only be a variety of the well known name of Phraotes. Now, if we could believe the somewhat apocryphal travels of Philostratus, this was actually the name of two princes of Taxila, of whom the younger one was twenty-seven years old* in the reign of the Parthian Bardanes, 44 to 47 A. D. But as the first Phraotes was the grandfather† of the other one, the date of the elder prince may be placed as high as 50 or even 60 B. C. This date is so

* Philostr. Apollon. II. 27.

† Ibid——II. 31——"My grandfather was a king, of the same name as myself, Phraotes."

near that which may be assigned on numismatic evidence to the coins; viz. B. C. 90 to 60, that I should have no hesitation in identifying the elder Phraotes of Philostratus with the Brahata of the coins, if I felt as certain of the correctness of my readings, and as sure of the authenticity of the Greek sophist's travels. But until some better preserved specimens of these rare coins shall be found, we must perhaps rest satisfied with the conjectural reading which I have given. I will only add another guess that the name of the satrap's father which certainly appears to begin with the two letters *O* and *ph* may perhaps be *Omphis* which we know to have been the name of the king of Taxila at the time of Alexander's invasion of India.*

Fig. 20. Round copper coin of middle size, weighing 156 grains. Common in Hazára and the Rawul Pindi district.

Obverse. Horseman. Greek legend in tolerably good characters, ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΜΕΓΑΛΟΥ ΑΖΟΥ.

"(Coin) of the king of kings, the great Azas."

Monogram before the horse formed of the two native letters *a* and *gam*.

Reverse. Minerva Promachos to the right. In the field a Greek monogram forming the syllable MIP, or MITP, and the Buddhist monogram of Dharma surmounted by a star or sun, the symbol of Buddha. Ariano Pali legend in bold and well formed characters.

Indravarma-putrasa Aspavarmasa stratégasa jayantasa.

"(Coin) of Indravarma's son, Aswavarma the victorious general."†

These coins are amongst the most important of the long and interesting series of Indo-Grecian numismatics. The sovereign in whose reign, they were issued, is the great Scythian Azas: but the coins themselves were actually struck by a Hindu general, who, by his use of the monogram of Dharma, declares that he was a Buddhist, and by his assumption of the Greek title of *Stratégasa*,

* Ktesias (Persica-Fragm.) has a similar name amongst the Persians, which he writes Ὀνόφαας.

† My authority for assigning the value of *rm* to the compound letter which occurs in both of these names, will be fully stated when I come to speak of the coins of Kozala Kadaphes.

Στρατηγος, shows that he commanded a body of troops amongst whom some traces of Greek discipline still remained. Whether the victorious Hindu general was a mere soldier of fortune, or a tributary chief who furnished a stated quota of troops, and who had led his own clan to victory, can only be conjectured. But the prominent fact of his issue of coinage which in the east has always been one of the most highly-cherished prerogatives of a king, speaks strongly in favour of the royalty of Aswavarma. It is possible that he may have considered the foreign title of *Stratégos* as a higher distinction than his native rank of Rája, or satrap; or he may have waived the publication of his royal title out of deference, or in obedience, to his paramount sovereign Azas, the great king of kings.

The title of Strategos proves also that the Baetrian Greeks had introduced into India their own military grades, as well as their discipline, in the same manner as the British have since done. The extent of the Greek dominion and influence in the Punjab are only now beginning to be understood. In my account of the temples of Kashmir, I have stated my opinion that their pillars and ovolo mouldings owed their origin to the influence of Grecian art. Since then, Dr. Stevenson* has made known three different inscriptions from the western eaves, which record the name of a Greek architect, The name is variously written as *Dhanukakata*, *Thenukakata*, *Dhanukakadha* which Dr. Wilson supposed to represent the Greek Θεονικος. Dr. Stevenson prefers Ξενοκρατης; but I think that the native transcript would be more fairly represented by Δεινοκρατης, which was besides the name of the celebrated architect of Alexander the Great.

Figs. 21 *and* 22.—Round copper coins of middle size, generally attributed to Azas. They are always of very rude style, and specimens with even a few legible characters are extremely rare. See

* Journal, Bombay Branch Royal Asiatic Society, Vol. V. p. 157. There are numerous verbal emendations which I think might be made in Dr. Stevenson's translations;—but I will only at present draw his attention to the opening of No. 5 inscription from Junir, which he reads *Isi mala sáminobhaya*. Now the first letter, which he takes for a peculiar form of the Swastika, is undoubtedly *Gri*, and the second, which he makes an initial *i*, is the figure 3, the opening being *Gri*: 3 or "three houses," to which I presume the inscription refers.

Ariana Antiqua Pl. VII. fig. 11, and Jas. Prinsep's Journal, Vol. IV. Pl. XXII. figs. 6, 7 and 8. The two legends in the accompanying plate are from specimens in my own cabinet. Fig. 21, is a small coin weighing 64 grains; but it is the best executed specimen that I have seen of this type. Fig. 22, is a middle-sized coin, much corroded, but with the legend in better preservation than usual: weight 166 grains.

Obverse. A humped bull. Greek legend, usually incomplete and illegible. On fig. 21, however, it begins with BACI, and ends with AΘOY, or AMOY.

Reverse. A two humped Bactrian camel. Ariano Pali legend, always imperfect; but on fig. 22, the following portion of the inscription is in fine preservation. Maharajasa A—

By a comparison of the two legends, they may be completed respectively as follows:

BACIλεως ασκα βAΘOY (or AMOY.)

Maharajasa Aswapaté (or *Varmasa.*)

"(Coin) of king Aswapati (or Aswavarma)."

The style of these coins is unusually rude, and the legends are always corrupt and defective. It is barely possible that they may belong to Aswavarma, the victorious; but as his coins, though executed in a stiff hard style, are generally in good preservation and very nearly complete in their legends, other specimens of these camel coins are much required for comparison, before we can venture to attribute them satisfactorily.

Fig. 23, is the inscription on a copper seal procured in the Punjab by Mr. Bayley. As the letters are reversed, this seal most probably belonged to one of these Indian satraps, who must have used it for stamping and authenticating his public documents. The Ariano Pali legend, has not been satisfactorily made out, but it appears to be

Sivasena chatrapa Atri naram Pathanavaré.

"(Sealed) by Sivasena, of the race of Atri, Satrap of Pothowar?"

The satrap's name may perhaps be *Sivapa*, as the opening letters may also be read *Sivapena*, instead of Sivasena. *Atrinaram* may be intended for "a man of the race of Atri," although such a form of expression is certainly unusual. *Pathanawáré*, I think, may more

probably be considered as the original form of the present Pothowar, which is a part of the Rawal Pindi district. There is every probability however, in favour of the satrap's descent from Atri; for the salt range is still called *Jádon-ka-dáng*, or hills of the *Yádavas*, who were one of the two celebrated branches of Atri's descendants. Perhaps if we could obtain a complete list of the *Jádon Bhátis*,* now settled in Jesalmer, we might find traces of Taxiles-Omphis, and of other chiefs, whose names are only found on coins and inscriptions. My list is much longer than Tod's, but is still very incomplete. A complete list may yet be procurable, for I possess one of the Jádon of Khiraoli, which extends to one hundred and twenty-eight names, from Krishna to the present Rája.

Fig. 24, is the inscription on the lid of the brass cylinder extracted by General Ventura from the great Manikyala tope, which I believe no one but myself has yet attempted to decipher. One of the names is still doubtful, but the remainder of the inscription seems to me to be perfectly clear. I read the whole inscription as follows:

Swati Siva Chatrapasa Gandaphuka Chatrapa putrasa danatrayam.

"The three gifts of the Satrap Swasti Siva, son of the Satrap Gandaphuka."

The last four letters of the inscription which, for want of room on the lid of the cylinder, are placed below, I read as *danatrayam*, "the three gifts." These, I suppose to refer to the three cylinders or relic boxes, which were deposited in the three separate chambers of the tope. The three deposits comprised the following articles.

Upper deposit at 12 feet from top. Iron (or copper) box enclosing a box of pure gold which amongst other things contained the following coins.

Gold coin of Oerki. *Reverse.* A four-armed seated figure with a crescent behind the shoulders styled MANAO-BAΓO. This figure I take to be the four-armed OKPO, the Supreme God, or *Mahádeva*, who, like Jupiter Osiris, is frequently represented with the lunar crescent. *Vagisa* was a name of Vrihaspati or Jupiter in India, as

* The people very simply and neatly distinguish between the Hindus and Musalmans of the same caste by varying the pronunciation. The Hindus are called *Bhátis and Játs*, the Musalmans, *Bhatis* and *Jats* (Bhuttees and Juts).

Βαγιστανος was in Persia.* *Manao* is no doubt the moon, and is the same word as the Doric Μανα and Anglo-Saxon Mona.

One thin Sassanian silver coin.

Two Indo-Sassanian silver coins.

One thick silver (or electrum) coin of rude execution, but of strong relief.† I possess two duplicates of this coin in mixed metal containing gold, silver, and copper. One was obtained within five miles of Manikyála, and the other at Amritsar. The complete inscription is *Sri Yaso Varmma*, which was the name of the celebrated Rája of Kanouj, the rival contemporary of Lalitáditya of Kashmir, who reigned from A. D. 693 to 729. I do not infer from this that the great tope was not built until A. D. 700, but simply that the uppermost chamber, with its enshrined relic, was accessible until that date. In most topes the relic chambers were made accessible with the view of extracting the relic boxes for annual exhibition to the people. Kings and conquerors could of course command a sight of them at any time. I suppose therefore, that on his invasion of the Punjab Yasovarma may have inspected the relics of the great Manikyala tope, and that his coin may have been deposited in the relic box by the grateful Buddhist fraternity as a remembrance of his visit.

The *second deposit*, at a depth of 45 feet, consisted of a copper box enclosing a cylinder of pure gold. Nothing was found in this casket, but it is probable that there was an enshrined relic which was not observed on account of its minuteness.‡

The *third deposit*, at a depth of 64 feet, consisted of another copper box, enclosing a brass cylindrical box "cast and turned on

* Both Diodorus, l. II. 13, and Steph. Byz. mention the Ὄρος Βαγιστανον. The name of the god who was worshipped there must have been *Bagis*, for Diodorus states Τό δὲ Βαγίστανον Ὄρος ἐστι μεν ἱερὸν Διός. Hence *βαγιστανος* is the Sanskrit *Vagisa-sthána* or *Vagisthána*, the temple or place of Jupiter. As the common language in the times of the Achemenidæ appears to have been almost pure Sanskrit *Bagistán* is a preferable reading to Behistun, which Col. Rawlinson has adopted.

† Journ. As. Soc. of Bengal, Vol. III. p. 137.

‡ In one of the Bhilsa topes, the precious relic, enshrined in a crystal casket, was a piece of bone not larger than a common pea.

the lathe," inside which was another gold cylinder. With these caskets were found forty-nine copper coins and one gold coin, all belonging to the two Indo-Scythian princes Oerke and Kanerki, or Hushka and Kanishka. In the gold cylinder, there was a small piece of silver, about the size of a shilling, on which were engraved two lines of Ariano Pali writing: see fig. 25. The upper line may be read without hesitation as *Gomangasa* "of the emancipated," or more literally of "one who has abandoned the body;" from *guna*, abandoning, and *angga* the body. The second line I read as *Kanarakasa*, taking the first and fourth letters as cursive forms of *k*. No doubt this plain disc of silver, as Jas. Prinsep supposed, was "intended to explain the whole mystery." This mystery, I believe to be explained by my reading of the two words as *Gomangasa Kanarakasa*, or "(relics) of the emancipated Kanerki." According to this reading, the great tope of Manikyala was the Mausoleum of the Indo-Scythian Kanerki or Kanishka, the paramount ruler of Kabul, Kashmir, and the Punjab, about the beginning of the Christian era. The brown liquid therefore, most probably contained the mortal remains of the great Indo-Scythian emperor, mixed with a portion of sandal wood or other ashes from his funeral pile.

With regard to the three gifts of Swasti Siva, the satrap of Taxila, I suppose that they may have been either the three distinct deposits which were found in different parts of the tope, or the three separate boxes of the lower deposit only. The former, I think, is the more probable conclusion, as the uppermost deposit contained a gold coin of Oerke, who was an Indo-Scythian prince of as early a date as Kanishka himself.

I formerly thought that *Gomangasa*, "of the abandoned body" had reference to the tope which was built over the spot where Buddha had "abandoned his body" to feed seven hungry tiger-cubs. But the publication of Hwan Thsang's life by M. Stan. Julien, which gives much more detailed accounts of the Buddhist monuments of India, shows that the "tope of the abandoned body" was not at Taxila itself. In this part of Hwan Thsang's text there appear to me at least two mistakes. These are, 1st, his placing the *Sin-thu*, or Indus, to the north of Taxila; and, 2nd, his placing *U-la-shi*, or Urasa (the Varsa Regio of Ptolemy and the Rash district of the

present day) to the *south-east* of the northern frontier of Taxila. The pilgrim had already visited the districts on the western bank of the Indus, and was now on his way from Taxila to Cashmere. For *Sin-thu* I would read the *Sohan* or *Swan* river, the *Soamus* of Arrian, beyond which the pilgrim arrived at a great gate of stone,* from which at a distance of 20 *li* to the south-east was situated the tope of the abandoned body. The high road from Taxila (or Manikyála), after crossing the Swan river, leads through the narrow pass of *Márgala*, or snake's neck, to Hasan Abdal. This rocky pass I take to be the "great stone gate" of Hwan Thsang, and the tope of Belar, near Osman Khátir, which is only about four or five miles distant, I take to be the "tope of the abandoned body." From this point, the district of *U-la-shi* bears north-east and not south-east.

I take this opportunity of again stating my firm conviction that Manikyala is the ancient Taxila. I do this because it has been stated in this Journal on several occasions, that I consider *Trakpari* to be the true site of Taxila.† On the contrary I have *always*

* Stan. Julien, p. 89—"une grande porte en pierre." *Pass* is perhaps the true reading instead of gate; for the two words are the same in different languages: thus the Sanskrit *dwára*, a door, is the Afghan *darrá*, a pass, a narrow valley, and the Indian *ghát*, a pass, is the same word as the English gate. Dr. Atkinson refers the name of *Már-gala* to a great battle; but the parallel names of *Ghora-gali*, "or horse's neck," and *Gidar-gali* or "jackal's neck," applied to passes in the same country, proves the correctness of my version.

† I allude more particularly to Major Jas. Abbott's article on the battle-field of Alexander and Porus which contains the above statement. Sir H. Elliot believed that such was my opinion, and others may have done the same. In 1839 my brother first informed me of the village *Takhála*, and in 1848 I saw the village myself, which is within musket-shot of the tope. I again repeat my belief that this village *preserves the name* of the ancient Takkasila. Some further arguments of Major Abbott's may be seen in this Journal for 1853, p. 573. He there states that "in the name Maunkyala (read Manikyala) we have no resemblance to that of Taxila." Granted: but Manikyala is only the name of a village in the neighbourhood of the tope, and not the name of the tope itself. We know that the name of Taxila is as old as Alexander, and that the establishment of the Buddhist religion in Taxila is most probably not older than the reign of Asoka. There would not therefore, be any connexion between the names of the tope and city. Major Abbott thinks that the remains around Manikyala are "the ruins of the monastery of *Mainkialan* described by Hwan Thsang." But there is a fatal objection to this identification in the fact, that this monastery was in the valley of the Swát river, to the west of the Indus. See Fo Kwe-ki, Appendice 379.

believed and maintained that Manikyala was the ancient Taxila. In proof of this I quote the following paragraph regarding *Ta-cha-shi-lo*, which I published in this Journal upwards of six years ago. "This is the Sanskrit *Tak-sha-shila*, and Pali *Takkasila*, the *Taxila* of the Greeks, as noticed by Lassen. *It is undoubtedly the present Manikyala*, which is surrounded by ruins. One of the neighbouring villages is still called *Takkála*, a name of the same import as Takka-sila, and most of the coins now procurable at Rawul Pindi, and in the neighbouring villages are brought from Manikyala."

Fig. 26. Part of the inscription extracted by General Court from a second tope at Manikyala. The portion which I have given is taken from the end of the 4th line. I have selected this part because it apparently contains the name of the elder of the two satraps of Taxila, who are mentioned in the other inscription. But the name is unfortunately doubtful, as the two copies which I possess of Genl. Court's inscription differ from each other, as well as from Genl. Ventura's inscription. I have ventured however, to read the name as Gandaphuka which I will retain for the present for want of a better or more probable reading.

The two inscriptions appear to me to contain the following important facts.

Genl. Court's inscription. "In the year 446 in the reign of Kanishka, Maharajah of the Gushang (tribe), the satrap Gandaphuka erected a tope (for what purpose I have not yet been able to decipher)." As a proof of his attachment to the Buddhist faith the inscription ends with the words, *Sacha-dhama-pidasa* "of the crown of the true *dharma*."

Genl. Ventura's inscription. "The Satrap Swasti Siva, son of the satrap Gandaphuka, made a gift of three relic caskets, for the purpose of enshrining the mortal remains "of the emancipated Kanerki or Kanishka."

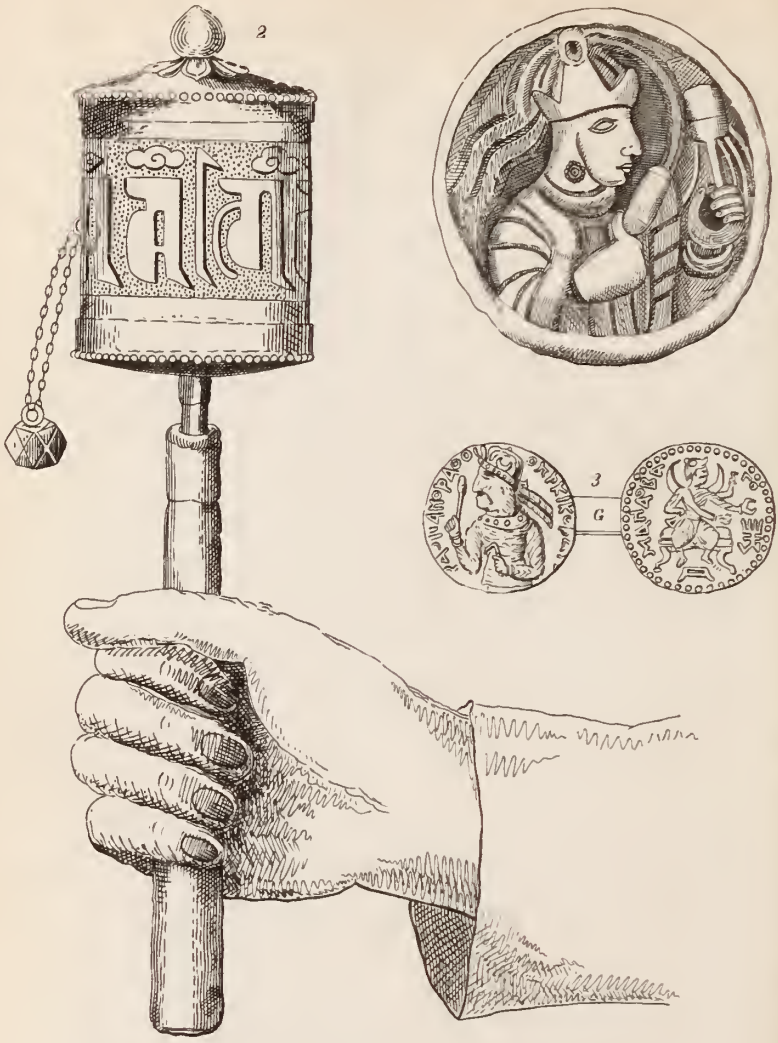
The date of the former inscription I have read as 446 on the authority of a stone slab in my own possession which gives in regular order the nine numerals* of as early a period as the Sah coins of

* In 1852 I discovered that these numeral figures, from 5 to 9, were the initial letters of their *Pashtu* names *written in Ariano Pali*. Thus 5 is represented by *p* for *pinz*; 6 by *sp* for *spaj*; 7 by *a* for *avo*; 8 by *th* for *atha*, the *a* having

the satraps of Saurashtra. The date I would refer to the Buddhist era of the *Nirvána* of Sakya Sinha, not as now established in 543 B. C. but as generally believed in by the early Buddhists for a period of several centuries. According to the Chinese Buddhists the Turki king Kanishka flourished 400 years after the *Nirvána*, and the great Asoka was converted to Buddhism 218 years after the same event, or 182 years before the date of Kanishka's rule. Now as the date of Asoka's conversion was the year 259 B. C. the epoch of the *Nirvána*, as generally accepted by the early Buddhists, must have been in B. C. 259 + 218 = 477 B. C. The difference between this date and B. C. 543 is 66 years, which is exactly the amount of difference between the Buddhist and Bráhmanical accounts of the length of sway of the nine Nandas. Taking this corrected date as our guide to the Buddhist chronology we obtain 477—400=77 B. C. for the accession of the three Turki kings Hushka, Jushka, and Kanishka; and as they are said by the Rája Tarangini to have reigned sixty years, we obtain B. C. 17 for the close of their sway. Now as the date of Genl. Court's inscription, 446—477=31 B. C. falls between these two fixed points of the accession and close of Kanishka's reign, there would appear to be some probability in favour of the correctness of my reading of the numerical figures.*

already been used for 7—and 9 by *n* for *nah*. Even the 4 is a *ch*, but as the Pashtu word is *salor*, this form must have been derived from India. The first four figures are given in two distinct forms, the second set being the older; and the two forms show in the clearest manner how the straight horizontal strokes of Asoka's, and even of later days, gradually became the 1, 2, 3 of India, from whence they were transmitted through the Arabs to Europe. Dr. Stevenson, in Bombay Journal, Vol. V. p. 38, found "a striking resemblance between the character denoting a thousand, and the Bactrian S reversed," and after an examination of the rest he "thought it exceedingly probable that they were all derived from that source." This was in an article read on the 17th February, 1853. *My* own more complete discovery was made somewhat earlier, in the summer of 1852. Dr. Stevenson's discovery besides deals with the higher number of one thousand; mine with the units only. But our independent deductions are the more satisfactory as they were obtained from different sources.

* As the *Harshakál*, or era of Sri Harsha, as recorded by Al-Biruni is within twenty years of this epoch, it is possible that the figured date of this text ١٢٨٨ may be a misreading for ١٠٨. The difference of exactly 400 years between the dates of Sri Harsha and of Vikramaditya is, to say the least, very suspicious.



4. From Salimpur, near Panjtár, Yusufzai.

5. From Ohind, Yusufzai.

A. Cunningham, del.

But the date of General Court's tope may be fixed approximately by the age of the Roman coins which formed the silver portion of the deposit in the relic caskets. The dates of these coins, which range from B. C. 73 to 33, fix the latter date as the limit of antiquity which can be claimed for the tope; and as my date of B. C. 31 falls two years short of this, there is at least some probability in favour of its correctness. The age of the great tope, opened by General Ventura, may therefore be placed in B. C. 17 or a little later.

I am in possession of two other dated inscriptions of the Indo-Scythians which I brought from the Yusafzai country in 1848. The older of the two (No. 5 of the plate) is dated in the year 333, which being deducted from 477 gives 144 B. C. This is somewhat earlier than the date of 126 B. C. which is usually assigned to the actual overthrow of the Indo-Grecian power by the Indo-Scythians. The date is followed by the word *Chitrasa*, which I take to be the month of *Chaitra*. The other letters I cannot make out satisfactorily, excepting a few in the middle which I read as *miti* 44.

The other incription (No. 4 of the plate) is dated in the year 390 or B. C. 87, at which time we know that the Indo-Scythians were in full possession of Kabul and the Punjab. The first line may be read, with only a little hesitation as to the name, as follows: *San* 390, *Srávanasa mása sudi prathame Mahodayasa Gushangasa rája.****

The letters which I have read as *Mahodayasa* might perhaps be read as Maharájasa: but the fact of the *Gushang** dominion and the date will still remain unaltered. The date is thus recorded: "In the year 390, on the first day of the waning moon of the month of Srávana."

I will now say a few words regarding the religious belief of the Indo-Scythian princes, which has already been the subject of conflicting opinions amongst the learned. Professor Ritter believed that they were Buddhists, and that the topes of the Kabul valley

* The *Gushang* of the inscriptions I identify with the *Khushany* and *Kushang* of the coins, and with the *Kieu-shang* (waggoners or *coaches*) of the Chinese. And, as we find the Kanishka of the Rájah Tarangini become Kaneŕki on the coins, so do I believe that the *Kushang* or *Gushang* are represented by the Greek KOPANO of the coins, and the χανδαναιος of Ptolemy.

were erected during the period of their sway. Professor Lassen, on the contrary, *was** opposed to the Buddhist origin of the Kabul topes because the coins which are usually found in them bear Mithraic types.† But as both Roman and Sassanian coins are also found along with the relics, it is certain that the types of the coins can have no connexion with the religion of the founders; which must therefore, be sought for by a closer examination of the other objects. The most usual deposits in the Kabul topes were "caskets or vases of copper, brass, or steatite, in one of which was generally found a fragment or two of bone," which Masson believed to have been the "essential relics over which the monuments were raised."‡ In the larger vases were found burnt (decayed?) pearls, beads, rings, seals, and other trinkets with gems, coloured stones, pieces of crystal, fragments of mother-of-pearl, &c. Only in three instances did Masson find inscriptions "one scratched with a style around a steatite vase, extracted from a tope at Darunta; another written in ink around an earthen vessel found in a tope at Hidda; and a third dotted on a brass vessel, within a tope at Kohwát."

The nature of the objects discovered by Masson in the Kabul topes is, in my opinion, quite sufficient to prove the Buddhistical belief of their founders. For the Buddhists alone, of all the people of India with whom we are acquainted, were in the habit of depositing precious stones and metals with the relics of their holy teachers. Thus we find it recorded in the Maháwánso,§ that Dutthagámini, king of Ceylon, after placing the relic casket in its chamber, made an offering of all the royal ornaments then on his person. This description satisfactorily accounts for the presence of finger rings and other ornaments which Masson found in the topes of Hidda, and which Lieut. Maisey and myself found in the topes near Bhilsa. The usual practice, which is continued to the present day amongst the Buddhists of Ladák, was to deposit a set of seven

* I say *was*, because I am ignorant whether he still holds the same opinion. I presume however, that his opinion has long since been changed.

† See note, p. 184, of the English translation of Lassen's Points in the History of the Greek and Indo-Scythian kings in Bactria, Kabul and India.

‡ Ariana Antiqua, pp. 59, 60.

§ Maháwánso, p. 190.

precious things, either of metals and gems, or of gems only. The simple fact of the discovery of these precious things in the topes of Cabul and India is, in my opinion, a sufficient proof of the Buddhist faith of the founders. But there is other evidence on this point still more conclusive and satisfactory to be found in the inscriptions which are engraved upon the relic boxes. I need not refer to those of the Bhilsa topes, which I have already published,* and about which there can be no doubt, but to the three inscriptions which Masson obtained from the Kabul topes. The principal of these was engraved on a steatite vase extracted from No. 2 tope at Bimárán, on the plain of Darunta near Jelalabad.

This important inscription consists of two lines; the upper line, which is engraved on the lid, being only an abbreviation of the longer one on the body of the vase. Both of these inscriptions open with the words†

Bhagavána Sarirahi

that is "(stupa) containing relics of BHAGWA'N," or Buddha. Now the word *Sarira* is the very term that was used by the ancient Buddhists to designate the relics or mortal remains of the founder of their religion, or of some of his principal followers. This peculiar word, under the form of *sha-li-le*, is still used by the Chinese Buddhists, and with the same signification. Lastly, it is correctly spelt with the palatal sibilant श, and not with the common *s*, स. The remaining words that are common to both lines of the inscription contain the names of the builder of the tope and of his father. Unfortunately some of the letters of these names are of unusual form, but the concluding word *putrasa* proves that the preceding letters must contain two names. I read this part of the inscriptions as follows:

Sri Tabachitrasa Khamaspada putrasa,

"(Gift) of Sri TABACHITRA, the son of KHAMASPADA."‡

The date of this tope may, I believe be safely ascribed to the close

* See "Bhilsa Topes," p. 298

† See Ariana Antiqua, Pl. II. of antiquities.

‡ The shorter inscription ends with four letters of which the first two appear to be *d* and *n*, for *dan*, a gift. The other two letters are doubtful. I read this inscription as follows:

of the reign of Azas, or about 90 B. C. For the relic chamber, which had evidently not been disturbed since the day on which it was first closed, contained, along with the usual quantity of gold ornaments and gems, four copper coins, all of which are of a well known type of the great Scythian king of Azas. As no other coins were found in this tope, the soundness of this conclusion is, I think undeniable. If this be admitted we have a clear and decisive proof of the prevalence of the Buddhist religion in the Kabul valley nearly one century before the Christian era. But as this fact is still doubted by at least one distinguished orientalist, I will now add another proof of a still earlier date.

All our most distinguished numismatists, French, German and English are agreed on one point, that the last prince of the Greek kingdom of Kabul was Hermæus, and that his immediate successor was the Indo-Scythian Kadaphes or Kadphizes. The date of the Scythian conquest is variously stated, but the extreme difference is less than thirty years. Raoul Rochette* assigns this event to 125 B. C. Professor Lassen† to 120 B. C. and Professor Wilson‡ to 98 B. C. The near agreement of such excellent authorities may be considered as fixing the close of the Greek dominion in India in the latter end of the second century before the Christian era. This point being established, I now proceed to show that Kadaphes or Kadphizes, the subverter of the Grecian dominion, was a staunch Buddhist.

The coins of Kadaphes, which are of a single type, always bear the same inscription without the change of a single letter. On the Greek side we find in small neat characters,

KOZOΛΑ KAΔΑΦΕC XOPANCY ZAΘOY.

"(Coin) of *Kozola Kadaphes*, king of the *Koransu*."

The Ariano Pali legend of the reverse, which is also in small neat

Bhagawána-sarirahi Sri Tabachitrasa Khamaspada putrasa dana.

"(Casket) containing relics of BHAGWA'N, the gift of Sri *Tabachitra*, the son of *Khamaspada*."

Two similar instances of relic *gifts* occurred amongst the Bhilsa tope deposits.

* Journal des Savants, 1835, p. 595.

† Lassen's Greek and Indo-Scythian kingdoms of Cabul, p. 283.

‡ Ariana Antiqua, p. 292.

characters, has never yet been fully read. This was partly due to the new style of the titles, and partly to the unusual forms of some of the characters. But my recent discovery of the true forms of the numismatic *ch*, and of its aspirate *chh*, now enables me to give what I believe to be a satisfactory rendering of every letter of the inscription. My reading is (see fig. 27).

Khushanga Yathaasa Kujula Kaphsasa Sachha dharmapidasa.

"Coin of the king of the Khushang Kujala Kaphsa, the crown of the true *Dharma*."*

The coins of Kozoula Kadphizes differ altogether from these in size and type and in the Greek legend, but the native legend is almost the same. They bear also two distinct Greek legends although the types and native legends remain the same. The earlier coins have ΒΑΣΙΛΕΩΣ ΣΤΗΡΟΣ ΣΥ ΕΡΜΑΙΟΥ, and were probably struck by the conqueror during the life time of Hermæus. The later coins have ΚΠΖΠΥΑΠ ΚΑΔΦΖΟΥ ΚΠΡϹΠ on the Greek side, and on the reverse in bold and well formed Ariano Pali characters the legend (see fig. 28.)

Kujula Kasasa Kushanga Yathagasa Dhamapidasa.

On a single well preserved specimen (see fig. 30) I find instead of the single letter *m* in the Pali word Dhama, a compound which I take to be *rm*, thus giving the Sanskrit form of *Dharma*. This compound letter may in fact be easily resolved into the Ariano Pali forms of *r* and *m*, the latter having the right horn of the crescent lengthened upwards.†

The same compound letter occurs twice on the coins of Aswavarma (in fig. 20) in positions which seem to confirm the correct-

* I have considered ΖΑΘΟΥ as a royal title, equivalent to the Sanskrit *Kshatra*, of which we have various Greek forms; Ξνατσης, Ξαστης, Ξνασταης, Ξαθσης. The last is nearly the same as that on our Indo-Scythian coins. *Zatha* or *Yatha* may however, be the name of a people, the ancestors of the modern *Játs*, The inscription would then be "(coin) of the Kushanian Ját, Kujula Kaphsa, the crown of the true *Dharma*."

† *Piḍa*, पीड, a chaplet or crown, is the Sanskrit word. The compounds *Dharma-piḍa*, the "crown of the *Dharma*," and *Sachha-dharma-piḍa*, the "crown of the true Dharma," are I believe, unusual; but they are grammatically correct, and eminently Buddhistical. We have an analogous title in the *Táj ud-din*, or "crown of religion" amongst the Musalmáns.

ness of the value which I have assigned to it. The differences in the spelling of the names of Kadaphes and Kadphizes I would refer to the issue of different mints, for the coins of Kadaphes are found only in the western Punjab: and those of Kadphizes in Jelalabad and Kabul: the former were most probably minted at Taxila; the latter at Dionysopolis and Kartana.

The constant assumption on all his coins of such common and well known Buddhist titles as *Dharma-pida* "crown of Dharma" (or the law of Buddha) and *Sachha Dharma-pida*, or "crown of the true Dharma," at once stamps king Kadaphes as a staunch Buddhist. The coins of Kadaphes moreover, are marked with a peculiar monograph which is found only upon his coins, and upon those of the single type of Azas, which was discovered in the tope of Hidda.

The proofs which I have given above of the prevalence of Buddhism in the Kabul valley towards the close of the reign of Azas in B. C. 90, and during the whole reign of Kadaphes from B. C. 120, are I think amply sufficient to dispel the doubts even of the most sceptical. In my work on the Bhilsa topes I have already proved the trustworthiness of that portion of the Mahâwâuso which treats of the proceedings of the third Buddhist synod and of the consequent dispatch of Buddhist missionaries to convert the people of various neighbouring lands.* Amongst these, was the *Yona* or Greek country of which the capital was Alasadda, or Alexandria. The date of this event was 241 B. C. in the twenty-third year of Asoka's reign, and the fifteenth year of Græco-Bactrian independence, from which period therefore, we ought to date the establishment of Buddhism in the Kabul valley. Another, and an equally independent proof of the accuracy of this portion of the Mahâwânso is afforded by the Chinese pilgrim Hwan Thsang who saw a stupa at *Na-kie-lo-ho*, or Nagrihar, near Jelalabad which was *built by the king Asoka*.

I will now say a few words regarding the religion of Kanishka and the other Indo-Scythian princes of Kabul and the Punjab, whose Buddhism has been doubted on account of the Mithraic reverses of their coins. The Râja Taranginî† expressly mentions that during the long reign of the three Turushka (or Turki) kings Hushka,

* Bhilsa Topes, p. 120. † Book I. V. 170, 171.

Jushka and Kanishka, Kashmere was in the hands of the Buddhists, and that the kings themselves built monasteries and temples for the worship of Buddha. The memoirs of the Chinese pilgrims Fa Hian (A. D. 400) and Hwan Thsang (A. D. 640) also ascribe the foundation of numerous topes in Peshawur, and Gandhára to the prince *Ki-ni-kia* or *Kia-ni-se-kia*, that is to the Kanerki of the coins and the Kanishka of the Rája Taringini.* I have no doubt therefore of the Buddhistical faith of the princes themselves, but I believe that the old Sabæanism of the east, which is fully represented on the reverses of their coins, was still the prevailing religion of the people. The first Kadphizes who calls himself "the crown of the *Dharma*" on the reverses of his coins, yet places a figure of the Grecian Hercules within the circle of the legend. In a similar manner the Indo-Scythian Oerke or Hushka who is seen with a Buddhist prayer cylinder in his hand on the obverses of his gold coins,* yet gives representations of the sun and moon, and of the five elements on their reverses. The Buddhist religion was eminently a tolerant one, and I presume that the Buddhist princes may have placed these Sabæan figures on their money with the sole view of gratifying the mass of their subjects amongst whom it was to circulate.

The last coins which I shall notice, are those of the family of Gondophares, which are highly interesting for several reasons: but more particularly on account of the very strong probability that this Gondophares is identical with the king Gundaforus who put Saint Thomas to death. The coins of Gondophares are common in Kabul, Kandahar, and Sistan, and in the western and southern Punjab. All these countries therefore, must have owned his sway. He was besides the head and founder of his family as no less than three members of it claim relationship with him on their coins: *Orthagnes*, his full brother, *Abdagases* his nephew, and *Sasa* (or

* See the accompanying plate of Indo-Scythian relics, in which fig. 1 represents the Tibetan prayer-cylinder of the present day:—fig. 2 is a bronze badge, and fig. 3 is a coin of Oerke, both representing the prayer-cylinder in the manner in which it may now be seen in the hands of the Buddhist Lamas of Thibet. The prayer-cylinder was certainly in use in Ladák as early as 400 A. D. when Fa Hian visited that country.

Sasan) a more distant relation. The coins of Orthagnes are found in Sistan, and Kandahar; those of Abdagases and Sasan in the western Punjab. I presume therefore, that they were the viceroys of those provinces on the part of the great king Gondophares, who himself resided at Kabul. All the names are those of Parthians, but the language of the coins is Indian Pali. Abdagases is the name of the Parthian chief who headed the successful revolt against Artabanus in A. D. 44. The great power of Gondophares, and the discovery of a coin of Artabanus countermarked with the peculiar monograph of all the Gondopharian dynasty, make it highly probable that the Indo-Parthian Abdagases was the same as the Parthian chief, whose revolt is recorded by Tacitus* and Josephus.† This surmise is very much strengthened by the date of the revolt, A. D. 44, which would make Gondophares a contemporary of Saint Thomas.

The peculiar monograph of all the coins of this dynasty affords a most curious and striking proof of the prevalence of the Indian language beyond the Indus. At first I thought that the name of Gondophara‡ was some compound of Phra or Phara which is found in so many Parthian names. But about three years ago when I was sketching a sugar-mill, the true meaning of the name flashed suddenly upon me. I have given a sketch of the common Indian sugar-mill in fig. 31, in which it will be observed that the outer channels for the cane-juice are chiselled in the very form of this peculiar monograph, which therefore, must be a pictorial representation of the compound name *Gánda-phor* गण्डफोड, or "sugar-cane crusher." I have never heard this term used, but it is regularly formed, and is in strict keeping with *Káth-phor*, the "wood-breaker," and *Pathar-phor*, or the "stone-breaker," which are the common names of the wood-pecker.

My object however, is not to speak of Gondophares himself, but of his relative Sasa or Sasan, whose coins exhibit the very same

* Annal. XV.—2

† Antiqua, XX. iii.—2, Josephus calls the father of Abdagases, *Kinnamos*: Tacitus names him *Sinnakes*.

‡ On the bust coins the name is ΥΝΔΟΦΕΡΡΟΥ: on the horseman coins it is ΓΟΝΔΟΦΑΡΟΥ. The native legend however, is the same on both, "*Gondophara*."

forgetfulness of propriety, which I have already described as shown by those of Kozoulo Kadphises and the Indo-Scythians. Thus Sasan also calls himself the "crown of the true Dharma," in a neatly engraved legend placed around a figure of Jupiter holding out a victory! There are two different types of the coins of Sasan; the one rare, the other common, both of which I will now describe.

Fig. 29. Round copper coin of middle size weighing 151 grains —rare. See R. Rochette, Pl. II. fig. 16, and Ariana Antiqua, Pl. V. fig. 19: also Pl. XV. fig. 2 of my unpublished plates.

Obverse. Horseman as on the coins of Azas. Greek legend always corrupt and incomplete, but on some specimens the letters ACHC are legible below the horseman. Before the horse the Gondopharian monograph.

Reverse. Jupiter standing and holding out a figure of victory. Ariano-Pali legend complete, excepting only a few letters which I have supplied without hesitation, as the wanting letters are too obvious to be mistaken.

Mahárájasa Rájadhirájasa sachha dha (ma-pidasa) Sasasa.

"(Coin) of the great king, the king of kings, the (crown) of the true Dharma, Sasa."

Fig. 30. Round copper coin of middle size, weighing 156 grains, see Ariana Antiqua, Pl. V. fig. 20; and my unpublished plate XV. figs. 1, 2, 3—common.

Obverse. Horseman as on the other, but the Greek legend is always jumbled.

Reverse. Jupiter with the *hásta-pura,* moving to the right. Ariano-Pali legend in bold legible characters.

Mahárájasa Mahatasa trádatasa Deva-hadasa Gondophara Sasasa.

"(Coin) of the great king, the mighty, the preserver, (of the race) of the divine Gondophares, Sasa."*

I have taken *Deva-hada* to be the Pali equvalent of the Sanskrit *Deva-hridya,* देवहृद्य, the "god-hearted," of which we have a counterpart in the Greek Θεοτροπος. I have before me about thirty good

* The Ariano-Pali name is written *Sasasa*, which I take to be the same as the well known name of *Sassan*, the progenitor of the Sassanian dynasty. I possess about thirty legible specimens. It is possible that this *Sasa* or *Sassan* may have been the ancestor of Ardshir the son of Babek.

specimens of this type, all of which agree in every letter of the legend. There is therefore, no doubt about the reading of the letters.

I cannot close this account without saying a few words in favour of my claim to the discovery of the true values of eleven letters, or of just one-third of the Ariano-Pali alphabet. The whole number of single-letters amount to thirty-five, of which Jas. Prinsep had assigned the true value to seventeen, or just one-half. To Mr. Norris is due the discovery of six single letters of which two are the monumental forms of *ch* and its aspirate; and the form of one letter *jh* still remains unknown. Of the nine known vowels (five initial and four medial) seven were determined by Jas. Prinsep, and two by me. Of the few compound letters which are at present known, the numismatic *anuswara* was discovered by Jas. Prinsep, the monumental one by Mr. Norris: but the attached *r* in *kra*, *tra*, *dra* and *stra*; the attached *t* in *st*, the attached *m* in *rm* are all due to myself. The single letters of which I claim the discovery are *g*, *gh*, *ng*; *ch*, *chh*; *ṭ*, *ḍ*; *ph*, *b*, *bh*; *v*; all of which, with the exception of the fourth and fifth, were made known in this Journal before the publication of Mr. Norris's alphabet in the Journal of the Royal Asiatic Society for 1846.

Examination and Analysis of two specimens of Coal from Ava, by H. Piddington, *Curator Museum Economic Geology.*

I am indebted for these two specimens to Captain Niblett of the H. C. Steamer *Sesostris*. Of No. 1, we have a capital supply of a maund or more, but of No. 2, we have only a little in a box; but quite sufficient to shew that it is altogether a different coal even by inspection: and with specimens of coal these remarks are not superfluous, for it is only by a good large supply of the coal that its quality can be fairly judged of and fair samples taken for analysis.

No. I.

Semi-Bituminous Coal.

No locality has been given with these specimens but we have in the collections of the Museum specimens in Major Burney's series

from Ava (Journal Vol. I. 1832) exactly resembling both these coals, and Mr. Jas. Prinsep, Vol. VII. p. 198, gives an analysis of a jet coal which is there entitled as, "From Kyendwen River;" and that specimen which closely resembles No. I. is labelled, "*From the sand banks Kyendwen River;*" so that the banks of this river are probably the locality of both of them. Both are moreover only "top coals" and thus we are no doubt giving an examination of inferior specimens to what the deeper beds will furnish when mined.

This coal is of the class which would be called semi-bituminous or steam-coal at home. It is tolerably tough and in alternating bright shining and dull laminæ, the proportion of the dull ones being much the largest. The bright laminæ are brittle and cannot be cut, the dull ones yield to the knife like jet-coal.

It flames well but does not melt, and its fine powder has the peculiar quality of coking to a tough and almost flinty coke in the crucible, which requires smart pounding to pulverise it.

The coke of the coal itself is of a bright steel grey, and with a close texture, the coal swelling a little and separating at the laminæ but retaining partially its shape. It burns very slowly, even when pulverised, and the ash is of a pale fawn red.

The smoke of the gases has the agreeable smell of good bituminous coal.

It is nearly free from sulphur of which there are only traces.

Its specific gravity is,	1.28

Its contents in 100 parts are:

Water (by independent experiment,	4.25
Gaseous,	26.50
Carbon,	67.85
Ash (pale red),	1.40
	100.00

This coal has then, evidently, all the properties of a first rate steam-coal; and I place below the analysis of two of the choice Welsh steam (red ash) coals.

	Ava coal, No. 1.	Pont-y-pool† *Mushet.*	Rosser-Wiliam's‡ *Mushet.*	Remarks.
Gaseous, ...	30.75*	28.50	30.00	*with water.
Carbon (coke), ..	67.85	69.00	68.50	†a well known coal.
Ash,*	1.40	2.50	1.50	‡Mynyddysburgh vein.

So far then as laboratory research will inform us this is a first rate coal; but I need not remark that the character of all coals depends greatly, especially in India, first upon how they are burned, and again that they are fair averages from the mine; and indeed with reference to No. II., if it is from near the same locality, that this coal, No. I. be not adulterated by a mixture of it. As to the burning, there can be no doubt that between the effects of climate the negligence of the stokers, and often the little attention paid by the engineers, much of our heating power has been wasted in India.

No. II.—Inferior Jet Coal.

This is a dull, slaty-looking coal, dividing in the weather-worn specimens into very thin laminæ and having on the weathered edges orange-red iron-stains.

It flames well and does not melt. Its powder does not coke at all like No. I. nor does the coal (as might be expected) shew any signs of coking; a lump of it in a closed silver crucible giving off its gas very readily but scarcely altering in appearance.

It contains a small portion of pyrites which are seen to have decomposed on the surface and between the laminæ in small spots.

Its specific gravity is 1.42.

Its contents in 100 parts are as follows, and I place next to my

* I have noted above that our coal and Welsh coal are all red-ash coals. The Pontypool ash contains lime, which ours does not.

results Mr. Prinsep's from his specimen Journal Vol. VII. p. 198, which are evidently not from the same coal, though from its appearance, it might be taken for it.

	Our present jet coal. H. Piddington. 1854.	Kyendwen coal. Mr. J. Prinsep. 1832.	
Sp. Gravity, ...	1.42	1.363	
Water, ...	11.88	8.00	
Gaseous,.....	32.12	40.00	(32.00, less
Carbon, ...	32.60	54.00	[water).
Greyish white ash; does not effervesce,	23.40	5.90	
	100.00	107.90	

There is evidently some error of the press in Mr. Prinsep's table, but we can only conjecture that it may have happened that he forgot to substract the 8.00 of water from the gaseous (volatile) result in the first operation when he had ascertained it as usual by an independent experiment which would leave 32.00 for the gases properly so called. Mr. Prinsep has not noted the colour of his ash which would perhaps enable us to ascertain if it was the shale of No. I. It is certain that No. II. is not the mere shale of No. I. on account of the difference of colour of the ash.

Literary Intelligence.

A Catalogue of the Sanskrit MSS. in the Royal Library at Berlin, by Dr. Weber, is the first of a series of catalogues of the MSS. in that Library which has been in progress since 1842 by order of the Prussian Government, on which the undertaking reflects great credit. The plan originated with Dr. Pertz, on his being appointed chief librarian of the Royal Library at Berlin, and at his suggestion Government directed that the first grants should be assigned to cataloguing the oriental MSS. As to the form of the catalogue it

was agreed to specify the number, material, form, binding, number of pages and contents of each volume, and to notice any obvious lacunæ of the text or other deficiences, appending at the same time a systematic table of contents, and a double index of authors and works, alphabetically arranged.

Dr. Röer has kindly drawn up from Dr. Weber's introduction the following sketch of the growth of the Sanskrit collection in this library.

"The first purchases in the Sanskrit department were made by the late Professor Wilkens, the immediate predecessor in office of Dr. Pertz, who bought in 1827 several MSS. which were formerly in the possession of the Serampore College and had been acquired by Professor Bernstein during his stay in England, viz. Nos. 456, 463 and 485 (three Puráṇas) 831 and 838 (arithmetic and astronomy), 1335 (prayers) and 409 (Bhagavadgítá). During his visit in England in 1829, Wilkens purchased through Messrs. Trenttel and Wurz, for £400, a collection, consisting of 205 Arabic and Persian and of 16 Sanskrit MSS. made by J. Murray since 1796: and in 1834 he was fortunate enough to acquire, by the mediation of Fr. Rosen, at the comparatively moderate cost of £105, a fine MS. of the Mahábhárata, including the Harivansa, with several commentaries, in 9 vols. folio, (Nos. 392 to 400): the latter formerly belonged to Sir G. Haughton.

"The Chambers' collection forms the most valuable part of this section of the Royal Library MSS. Dr. Pertz thus details the history of its acquisition.

"'This valuable collection was made in India during the last quarter of the 18th century. Sir R. Chambers, an eminent man of thorough and various attainments, collected during his residence in Calcutta from 1774 to 1799, an Indian Library of great importance, and acquired, at a cost of £25,000, it is said, a great number of MSS. unparalleled as regarded Vedic literature and containing many important works in other branches of Sanskrit literature. From the papers, added to this collection, it appears, that soon after his arrival in India, he entered into communication with distinguished native scholars; thus he consulted pandit Mana Krishṇa Tripatti on the Veda literature, on the Sáma Veda, Ananta Rámarája, on the

Yajur Sheve Kumjee Doobeh, and on the literature of the Puráṇas Harináma Kaula, who is mentioned as Harry Ram Cowl, and devoted a particular attention to the examination and the acquisition of legal works. The collection of pandit Govardhana Vyása, which contained among other works 6 Puráṇas, and also those of Devadatta Ojhá, of Krishṇadatta and of Siva Lála Ojhá, were purchased in 1783, and in 1785 Sir Robert acquired a number of pieces of the Sáma Veda from Ibrahim Vaha.

"'The 78 MSS. bearing dates from Samvat 1831 to 1855, are probably transcripts made by order of Sir Robert. The copying of the Vedas, according to a statement of the last owners, has cost about £1000. The collection contains a few MSS. of the 14th century and several of the 15th; their number increases in the 16th, and attains its maximum in the 17th, although it is still considerable in the 18th century. Even in India it attracted great attention, and many references were made to it.

"'In 1799 Sir Robert returned to Europe with broken health, and after his decease, in 1803, the collection remained in the possession of his family. Several negotiations to sell it to the British Museum, the Russian and Bavarian Governments, were not successful. Ch. Wilkens drew up, in 1825, a catalogue for the British Museum, but the sale of the collection was not effected in consequence of the high price asked for it. Some years afterwards, W. von Humboldt conceived the idea to acquire those MSS. for Prussia, and proposed to the Government to make an offer of 30,000 Thalers Courant. The sum, however, appeared too high, and the proposal was declined. In 1829 Fr. Rosen, at the request of Lady Chambers, made a catalogue of the collection, 210 in number, which was published in order to bring the treasures of the collection to public notice. This measure also failing, Mr. Robert Chambers, after the death of his mother, had a new catalogue prepared by Mr. Forbes, which was printed in May, 1841. The public was at the same time informed by it, that the sale of the collection would take place on the 13th April, 1842. Thereby induced and on the urgent entreaties of Lassen and Höfer, Chevalier Bunsen, then Prussian ambassador in London, again took the matter up, and by a cabinet order of the king of Prussia of the 20th May, the

purchase of the collection was sanctioned. No offer having been made on the 13th April, and one by the French Government after the day of the sale not having been agreed to, the negotiations on the part of Prussia were carried on by Ch. Bunsen through Professor Höfer, and on the 20th May the purchase was effected for the sum of £1250.'

"On the plan of his catalogue Dr. Weber remarks (p. xxii. preface),—'After the names of the author and the work have been given, it is stated, where and by whom the work has been edited. Then follow the number of the chapters and of the pages, with the signature of the copyist, the date of the copy, the extent of each chapter, the number of its verses, and its name. Then the commencement of the work is given together with such dates from its introduction and its close as may throw light on the person and the circumstances of the author and the time he wrote. When describing works of importance and especially such as have been hitherto unknown, I have added the commencement of each single chapter and sometimes also other extracts; on the other hand, I have given as short a notice as possible of works which have been published, or are in the course of publication, unless the MS. exhibited a great difference from the published text.

"'The arrangement of the different parts depends upon the place which they respectively occupy in the literary history of India, and in this respect I refer to my lectures on the history of Indian literature. Within every division I have arranged the numbers, as far as practicable, chronologically, with this restriction, however, that the commentaries and similar writings are placed next to those works which they explain, or of which they treat.'

"This arrangement of his literary materials is in accordance with the rules of logical analysis, and Dr. Weber was fully justified in rejecting the division of old Hindu writers by which the whole body of Sanskrit literature is classed under three principal heads which have 14 subdivisions. That part of the catalogue which refers to Vedaic literature, is the most comprehensive, but the whole work has been executed in a scholarly manner and with great accuracy. Dr. Weber's lectures, above quoted, have solved and elucidated many questions previously obscure or lost sight of.

"Catalogues such as these are not only a saving of time and trouble to the literary student, but are, moreover, guides to the discovery of works, buried and, for all practical purposes, lost in libraries of private individuals, who, in not a few cases, knew not, and, in others, act as though they knew not, the value of the treasure and the trust of which they are accidentally the custodians. This remark applies with especial force to the known stores of Sanskrit literature, a history of which has never been attempted by Hindu writers, what is known of it being mostly derived from general classifications and occasional notices and references, found in works dedicated to scientific research. There are a large number of Sanskrit works, unknown even to native scholars, notwithstanding that they are within the range of their particular studies, and such works ought surely to be preserved in the archives of a public library, where alone they can assume the due and practical importance which belongs to them. The several collections of Sanskrit works, made chiefly by Englishmen towards the close of the last and the opening of the present century, may embrace as valuable a portion of Sanskrit literature as any that may yet remain hidden, still the known, compared with the unknown, is probably but a fraction, and not a considerable one. For a collector of MSS. it is of the highest importance to know, whether a work with which he may meet, is already to be found in collections, information which can only be obtained from published catalogues. The collection of Fort William as well as those of the Sanskrit Colleges of Calcutta and Benares respectively have been embodied in the catalogue, printed by our Society, which however is very imperfect and often incorrect. Professor Hall is now preparing a descriptive catalogue of the Sanskrit collection in the Library of the Benares College, and has already met with a great number of works in all branches of Sanskrit literature, works hitherto unknown to us."

Dr. Röer's concluding remarks on the value of Catalogues are quite to the point and his strictures on our Society's Sanskrit Catalogue, compiled so far back as 1838, merit the attention of our Philological Committee. A revised English Catalogue of our MSS. in the Raisonné form, such as we now have for the St. Petersburgh, Leyden and Berlin collections, is a great desideratum, and it should

embrace all the Sanskrit MSS. traceable in private collections in the neighbourhood of the Presidency. It is probable that such native gentlemen as have MSS. would cordially respond to any invitation to produce them, which might emanate from the Society.

The Royal Asiatic Society has just published a descriptive catalogue of 163 Arabic and Persian MSS. which form the historical portion of its collection. The work is edited by Mr. Morley, and contains a short analysis of each history, mentioning where extracts have been published by Sir H. Elliot. It further gives such information as is available of the author of each work, and describes the exact size of each volume. Garcin de Tassy has noticed some of the more important MSS. of this collection in a late No. of the Journal Asiatique.

In No. 12 (May and June) of this same Journal M. Defrémely commences a paper entitled 'Nouvelles Recherches sur les Ismaéliens ou Bathiniens de Syrié,' better known under the designation of Assassins. The author announces that he has had access to sources, some of which were not consulted by Falconet, De Sacy and Quatremère and others of which were far from being exhausted by them. A paper by M. Garcin de Tassy follows on the proper names and titles in use by Musalmans, and the No. concludes with a list, alphabetical and chronological, of the names given by Chinese emperors to the years of their reigns from the Han dynasty downwards, and drawn up by M. de Meritens. M. Chodzko replies to the Kazan professor's criticisms of the new system of pronunciation introduced into his Persian Grammar. The No. concludes with an obituary notice of M. Marcel, one of the founders, and since 1847 a 'Censeur' of the Paris Society.

The July No. contains M. Mohl's Annual Report from which it will be seen, that the object of the recent changes in the mode of publishing our Bibliotheca Indica is appreciated in Europe. The learned Secretary's remarks on the value of such collections as are now being published in Paris as well as in Calcutta are striking. The Chinese and Tibetans have long since anticipated us, the collection in the former language made by the emperor Kienlong, being represented to equal in size about 30,000 vols. of an European library. The Turks at Constantinople and

the Armenians at Venice are yet engaged on the publication of a series of their national authors. The 'colossal enterprize' of our own Elliot is noticed in connexion with this subject, and with a touching allusion to the heavy loss occasioned by his death.

No. III. of the Zeitschrift of the German Oriental Society opens with a notice, by Professor Pott, of the recent contributions to Comparative Philology in the works of Norris, Rüs and Crowther on several dialects of Central and Western Africa. Graf discusses with reference to statements put forth by V. Hammer and Spiegel, the interpretation to be put on the 'D'Sulkarnein' or 'two-horned' of the 18th Surah of the Korân. He maintains with the best commentators on this work, that the allusion is to Alexander the Great. Some suggestive remarks follow, by Benfey, on the figures and names of divinities on Indo-Scythian coins, and on the interpretations given to them by Lassen. Dr. Roth translates passages from the Rig Veda which describe the ceremonies attending the burial of the dead in ancient India, and which show how opposed were the tendencies of the old Hindu ritual to the practice of Sutti, subsequently introduced by the Bráhmans. A paper by Blan on the modern history of Syria, and the continuation of one commenced some months back by Von Hammer on Saalchi conclude the No.

Among the correspondence, is a letter from Dr. Von Erdmaun of Novogorod on the question lately discussed by Dr. Sprenger and Professor Fleitcher regarding Muhammad's communications with the Monk Boheira during and subsequent to the prince's journey to Syria.

No. 2 of the Journal of the American Oriental Society opens with a translation, by Mr. Harrington of Ceylon, of the Siva-Pirakásam, a metaphysical and theological treatise in Tamul, about two hundred years old. Then follow a notice, by Mr. Whitney, on the Vedic texts, a paper on the Talaing language, by Dr. Mason, and two others on the Karens, with a comparative vocabulary of their two dialects, the latter by Mr. Brown of Assam. A notice of Mr. Perkins's translation of a Syriac Life of Alexander the Great found in MSS. at Ooroomiah, but which proves to be nothing more than a Syriac version of Callisthenes, concludes the original contents of the No.

Among the correspondence is a highly interesting letter from Dr. Lobdell at Mosul, dated a year ago, but so full of promise for further discoveries, that we will give an extract from it.

"Nebbi Yunus is a little South of Koyunjik, but still remains almost intact, from the superstitious dread of the Mohammedans of disturbing the repose of Jonah, to the lofty *jam'eh* over whose tomb the Moslems go every Friday in great numbers from Mosûl, a mile distant, to pray. Helmy Pasha, the present governor of this district, did excavate somewhat in that mound last year, and found several large bulls and human giants, much injured by fire, and a few small antiques; among other things, a bronze lion on one side of which was an inscription which Col. Rawlinson reads: *Esarhaddon—the conqueror of Misraim and Cush.* Other inscriptions are said to assert that this mound of the prophet was built by captive women, and that of Koyunjik by men, from Babylonia.

"The Pasha's object in setting his manacled prisoners to work in a cellar, where one of the bull's heads was accidentally discovered, was to find gold, and he instructed his overseers to search carefully under the feet of the bulls for treasure! None appearing, he desisted; the inhabitants refused permission to the English and French to continue the explorations, and the antiquities of Nebbi Yunus are likely to be for some time yet undisclosed.

"A company has recently been formed in London for the purpose of excavating in the mounds of Lower Mesopotamia and Assyria, entirely independent of the British Museum, though it is expected they will work under the charter granted Mr. Layard and his patrons, which allows the removal to England of all objects discovered.

"The French are obliged to offer the Sultan one-half of all they find, and a late attempt of Mons. Place, the French Consul in Mosûl, to raft some fine bulls and winged human figures to Baghdad and Busrah, was opposed by the Pasha on the ground that he had not given the Cabinet of Antiquities lately opened in Constantinople, an opportunity to take the share due to the Turkish Government. These large slabs were drawn from Khorsabad, about twelve miles distant, on a cart built by the Consul expressly for the purpose in the strongest manner, the wheels being about twenty inches in dia-

meter, without spokes, by some three hundred Arabs for whom harnesses were made to order. The blocks now lie on the eastern side of the Tigris, under rude mud coverings which were built to prevent the sulphate of lime of which they were composed, from speedy decomposition. Sandstone was sometimes used for bulls in Nimroud, but gypsum was the common material, and this soft marble is susceptible of being most delicately wrought. It is easily worn by water, and even the rains of this hot climate are sufficient to decompose it very rapidly. It is only the immense mass of earth above the Assyrian sculptures which has preserved them from age to age.

"It is presumed that permission will be given to Mous. Place to remove the sculptures, which are destined for the Louvre, as application has been made to the French ambassador at the Porte, who is now in quite as good standing at Constantinople as Lord Stratford, and in fact wields almost as much power as the Sultan himself.

"Mr. Loftus, who was recently attached to the Commission appointed to run the boundary-line between Turkey and Persia, as geologist, passed through Mosûl a few days since on his way to Baghdad, in charge of the expedition fitted out by the newly formed English company. He expects about £20,000 to be placed at his disposal, and, with the advice of Col. Rawlinson, he will first lay open some of the sarcophagi in the great series of mounds at *Werka* —by some supposed to be the Ur of the Chaldees—and then explore various other *tels* in Mesopotamia. Should nothing of great interest be found there (you know that but few sculptures have ever been discovered in Babylonia, as gypsum-quarries are wanting there), he will come northward and continue the excavations so auspiciously begun by Layard and vigorously prosecuted by Rawlinson. The latter was just about to cease operations for the British Museum, and to send home the artist, when a discovery was made which promises to be not inferior to any made by Layard. The Colonel has not till recently had great success in excavating: a few slabs were found at Nimroud, some bricks, and ivory and copper utensils, with one or two basalt obelisks, well broken in pieces; and some large earthen cylinders, said to be of considerable interest, as at least one hundred years older than the sculptures of Nimroud, belonging to the time of Tiglath Pileser, turned up at Kalah Sherghat. Small

books—blocks of a light coloured clay, finely written over with arrow-heads—have been found in considerable numbers at Koyunjik, enough, indeed, to form quite a library, with vases, scarabei, cylinders and seals; but it was not till last week that anything of special interest was exhumed. I shall presume that you will be glad of a detailed account of so much of the new palace as has been laid open, since Rawlinson will not publish anything on the subject for some time to come. It will give me pleasure to communicate to you the result of further excavations, which, it is presumed, will now be prosecuted with considerable vigour, instead of being brought to a speedy close, as was anticipated."

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For October, 1854.

At a meeting of the Society held on the 11th instant, at half-past 8 P. M.

Bábu Rámgopál Ghose, Vice-President, in the Chair.

The minutes of the last month were read and confirmed.

Presentations were received—

1. From the Government of Bombay through Lt. Furgusson in charge of the Magnetical Observatory at Bombay, Magnetical and Meteorological Observations for 1851.

2. From F. E. Hall, Esq. Benares, a MS. of the Tarikhé Rahimi. With reference to the work Mr. Hall states: "The copy is a very old one; in fact I have grounds for believing it to be an autograph. * * * Dilapidated as it is, it is highly probable that it may be thought worth being consulted by another Elliot, if India ever produces a man of kindred tastes."

3. From Professor Oldham, Geological Surveyor, specimens both geological and palæontological from Assam, Tavoy, Tenasserim, Beerbhoom, and the Rajmahal and the Khasia Hills.

4. From the Government of Bengal through Mr. Under-Secretary Young, specimens of Iron Ore from Upper Assam, collected by Capt. Hannay.

5. From the Government of India through Mr. Secretary Allen, specimens of Smelted Iron and Iron Ores from Ramghur, Kumaon, forwarded by Lt.-Col. H. Drummond.

6. From C. Trevor, Esq. on behalf of Capt. Porter, 10 Burmese MSS.

7. From Lt. Chase, a Hand-book of the Burman language.

8. From H. Stainforth, Esq. C. S. through Capt. Thuillier, Ancient Hindu Sculptures from the ruins of Gour.

W. Muir, Esq. C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following names were announced for ballot at the next meeting.

G. A. Bushby, Esq. C. S.,—proposed (for re-election) by C. Allen, Esq. seconded by Mr. Grote.

F. A. Lushington, Esq. C. S.,—proposed (for re-election) by A. Grote, and seconded by Bábu Rámgopál Ghose.

Lt. Nicolai W. Elphinstone, 4th Regt. N. I. Assistant Commissioner in the Punjab,—proposed by Lt. Lees and seconded by Capt. James.

Lt. H. S. Bivar, Jun. Assistant Commissioner in charge of Northern Cachar,—proposed by Capt. Dalton and seconded by Mr. Grote.

T. Boycott, Esq. Bombay Medical Service, Assay Master, Calcutta Mint,—proposed by Dr. Falconer, and seconded by Mr. Allen.

Communications were received—

1. From Bábu Radhánath Sikdar, enclosing Abstracts of meteorological observations taken at the Surveyor General's Office, Calcutta, during the months of June and July.

2. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces, forwarding Meteorological Observations kept at the Secretariat Office at Agra, for the month of August, 1854.

3. From W. Theobald, Esq. submitting the following papers:

1.—On the Geology of the Salt Range.

2.—Notes on the Nidification of some of the commoner birds of the Salt Range with a few additional from Kashmir.

4. From the Government of Bengal through Mr. Under-Secretary Young, communicating a paper entitled "Notes on the languages spoken by the Mishmis," by W. Robinson, Esq.

5. From Bábu Rájendralál Mittra, submitting notes "on the Peculiarities of the Gáthá dialect."

6. From Capt. Dalton, Debrughur, enclosing a paper, by Mr. W. Robinson, "On the ancient history of Assam."

7. From Dr. Campbell, Darjiling, forwarding some "Notes on Eastern Thibet."

8. From Mr. Blyth, submitting a "Memoir on the Indian species of Shrews."

The Librarian and the Curator in the Zoological department submitted their usual monthly reports.

J. W. COLVILE, *President.*

Confirmed 3rd Nov., 1854.

Report of Curator, Zoological Department, for September, 1854.

During the last few days, the Society's Museum has been enriched with numerous specimens of interest.

1. In a box addressed to the Secretary, and marked Moultan, care of Babu Ananda Chandra Basu, Sub-Assistant Surgeon,* have been sent a bottle of *petroleum*, which has been made over to the Geological department, and the skin of a small Fox, with skull and several other bones of another individual of the same species.

This little Fox pertains to a species hitherto undescribed and merely vaguely indicated, which I have long sought to verify. The Hon'ble Mountstuart Elphinstone remarks, of the Foxes of the great Hurriâna desert, that these "are less than our [the English] Fox, but somewhat larger than the common one of India: their backs are of the same brownish colour with the latter; but in one part of the desert, their legs and belly up to a certain height, are black, and in another, white. The line between those colours and the brown is so distinctly marked, that the one kind seems as if it had been wading up to the belly in ink, and the other in white-wash." (*Account of Cabul*, &c. p. 7.) Mr. Walter Elliot would not appear to have discriminated this small Fox of W. India from V. BENGALENSIS; further than by the observation, that—"It is remarkable that though the brush is generally tipped with black, a white one is occasionally found; while in other parts of India, as in Cutch, the tip is always white." (*Madr. Journ.* X, 102.) We have little doubt that Mr. Elliot's supposed variety of V. BENGALENSIS with white-tipped tail, refers to the present species: but Mr. Griffith's smaller Fox of Afghanistan (*J. A. S.* X, 978,) is different; and so we now consider Mr. Theobald's small Fox of the Punjab salt range (*J. A. S.* XXII, 581,) to be, and this may bear the appellation V. PUSILLUS. The small desert Fox of W. India may be designated

V. LEUCOPUS, nobis. It is a typical VULPES, which V. BENGALENSIS is not; of the size of BENGALENSIS, or smaller than PUSILLUS. The specimen under examination is an adult female: general colour pale; the

* This box was delivered at the Museum by a servant, who stated that his employer had died on the journey down, and that he had accordingly taken charge of his late master's property, including the box here noticed.

cheeks, sides of neck and of body, and the inner side and most of the fore-part of the limbs, white; with a few blackish tips intermixed on the sides of the body, though insufficient to affect the white appearance at a little distance: shoulder and haunch, with most of the outside of the limbs nearly to the mid-joint, a mixed black and white, with the under-fur whitish-isabelline: on the face, middle of back, upper-part of tail, and hind-part of the outer side of the fore-limbs, a light fulvous hue prevails, slightly mingled with black and white upon the back, where the under-fur is pale slaty: tail mostly pale, except towards the base above, and largely tipped with white: lower parts pale nigrescent (in old males probably much darker, with increased admixture of black upon the limbs; so that, upon inspection of this specimen, it is easy to comprehend the varieties of colour mentioned by Elphinstone): ears black posteriorly; and larger than in V. BENGALENSIS: the fur soft and fine, as in V. MONTANUS and V. PUSILLUS; altogether dissimilar from that of V. BENGALENSIS. The skull, as compared with that of BENGALENSIS, has the muzzle distinctly narrower; and the lower jaw is weaker, with much narrower coronal process. We have vainly tried to identify this Fox with any named species.*

* The following is the series of Indian and Tibetan Foxes now in the Museum of the Society.

1. V. NIPALENSIS (et *flavescens*), Gray: *V. montanus* apud Hodgson, *passim.* Described in *J. A. S.* XI, 589. The common large Fox of Tibet, rarer S. of the snows, and believed by Mr. Hodgson to be V. MONTANUS until we shewed him the identical specimen upon which the latter was founded by the late Mr. Pearson. In Dr. Gray's printed catalogue of the specimens presented by Mr. Hodgson to the British Museum, *V. montanus* apud Hodgson is identified with V. FLAVESCENS, Gray; but it differs much from the small Afghanistan Fox which we have hitherto referred to V. FLAVESCENS (vide *J. A. S.* XIV, 314). This handsome species is of the size of V. VULGARIS and V. MONTANUS, but has much finer, longer, and denser fur, of a prevailing bright light yellowish-fulvous colour, with correspondingly superb brush, and the black ears strongly contrasting. The Society's specimens are from beyond the snows.

2. V. MONTANUS, Pearson: *V. himalaicus*, Ogilby. Like the British V. VULGARIS, but always much less rufous, paler and more hoary; specimens varying, however, a good deal in colour. Common in the N. W. Himalaya, as about Simla and Masuri; and the larger Fox of Afghanistan was thought to be identical with it by the late Mr. Griffith.

3. V. PUSILLUS, nobis. The small Fox of the Punjab Salt Range. Nearly resembles the last, except in being a much smaller animal.

4. V. GRIFFITHII, nobis, *n. s.* The ordinary small Fox of Afghanistan (vide

2. Capt. Berdmore, Schwe Gyen, Pegu. Skin of a small Flying Squirrel new to the museum, and apparently identical with the Javanese Sciuroptera sagitta, (Lin.).* Also some Bats in spirit,—Nycticejus luteus and N. Temminckii, and three specimens of Vespertilio adversus, Horsfield. Skin of Polyplectron chinquis, Tem.: and various reptiles and some insects in spirit. Among the former is a nearly adult example, and three young, of Leiolepis Reevesii, Gray;† one of Xenopeltis concolor; a small Dipsas multimaculata; Rana vittigera, Weigmann;‡ Hylædactylus bivittatus, Cantor; Engystoma (?) interlineatum, *n. s.*; E. carnaticum, Jerdon; and Bufo melanostictus.§ The insects are chiefly *Coleoptera*.

J. A. S. XIV, 344). Size of last, or larger than V. leucopus, with longer fur, and the pale parts tinged with yellowish-fulvescent.

5. V. leucopus, nobis, *supra*. The small desert Fox of W. India.

6. V. bengalensis, (Shaw): *Canis kokree*, Sykes: *C. rufescens*, *V. chrysurus*, et *V. xanthurus*, Gray: *V. corsac* apud Ogilby. India generally, but not Ceylon.

7. V. ferrilatus, Hodgson. Tibet. *N. B.* Lt. Speke, of the 46th N. I., informs us that he is familiar with three species of Foxes in Tibet; two of which he identified in our museum with Nos. 1 and 7, and the third he stated to be more like No. 6;—doubtless, therefore, the true corsac of Pallas, which according to Dr. J. E. Gray "is very similar to V. bengalensis, but differs in having no grey collar round the front of the chest."

* It is nearly affined to Sc. spadiceus, nobis (*J. A. S.* XVI, 867), from Arakan; but is larger, with the upper-parts much less rufous. Length about 6 in.; and the tail 5 in.: tarse with claws, $1\frac{3}{8}$ in.

† "This beautiful Lizard," writes Capt. Berdmore, "called by the Burmese *Padat*, is by no means uncommon. It burrows in sand; and the Burmese eat it."

‡ *Act. Acad. Leopold.* Vol. XVII, pt. 1, p. 255, and t. XXI, f. 1, (1835); from Philippines and China: identical with *R. assimilis*, nobis, *J. A. S.* XXI, 355, from Bengal, Arakan, and Pegu.—R. rugulosa, Weigmann, *ibid.* p. 258 and t. XXI, f. 2, is identical with *R. bengalensis*, Gray, apud nos, *ibid.*

§ The Hylædactylus bivittatus, Cantor, *J. A. S.* XVI, 1064, appears to be subject to considerable variation in its colours and markings. Dr. Cantor describes the mature male. An adult female measures—Head and body, 2 in.; hind-limb the same, of which the foot (to end of longest toe) is half; fore-limb, $1\frac{3}{8}$ in. Form tumid, inelegant: the back much arched. Skin thick and leathery; above smooth, below minutely corrugated. Colour (in spirit) deep reddish-brown, clouded above with dark olive-brown, margined with black. A large dorsal patch is first conspicuously visible at the occiput, where narrow, widening much over the back; besides its black edge, this is mottled with a few scattered black spots. An irregular blackish line passes backward from each eye: and the hind-limbs are

3. Capt. S. R. Tickell, Maulmein. Various bird-skins, including CRYPSIRINA VARIANS; GARRULAX CHINENSIS (shot about 100 miles south of Maulmein, associating with the common G. BELANGERI of the Tenasserim Provinces); EMBERIZA AUREOLA, Pallas (of which *Euspiza flavogularis*, nobis, *J. A. S.* XVIII, 811, proves to be the same bird when not in its nuptial livery); and GALLOPHASIS LINEATUS.

4. Capt. Fletcher Hayes, Lucknow. Skull of VULTUR MONACHUS.

5. Mr. R. Spears. An enormous tree-fungus, which was picked up floating in the Brahmaputra, and is considered by Dr. Falconer to be an undescribed species of POLYPORUS, which he designates P. MELADERMA.*

6. Dr. E. F. Kelaart, Galle. Various reptiles, and a fine collection of Cinghalese insects, sent in spirit.

7. W. Theobald, Esq. Junr. A considerable number of specimens in

banded more or less obscurely, the reddish-brown ground-hue becoming paler and brighter on the thighs posteriorly, where mottled and spotted with black. Hab. Pegu, Mergui, and the Malayan peninsula.

ENGYSTOMA (?) INTERLINEATUM. *n. s.* Hind-feet more webbed than in typical ENGYSTOMA: the belly and under surface of the thighs tuberculated; with also a few larger warts on the thoracic region. Length of head and body, $1\frac{1}{2}$ in.; of hind-limb, $1\frac{3}{4}$ in. Colour, a golden clay-brown above, with medial blackish vertical streak, diverging into two at the nape, which are continued to the base of each hind-leg, and when the hind-leg is closed, it appears to be continued on to the limb. Anteriorly to the eyes, a narrower branch passes over the orbit and is also continued to the base of the hind-limb; and a median duller line appears on the croup, which abruptly diverges widely towards the vent. Narrower intermediate lines are also traceable; and the principal streaks are set off by a pale golden edge. Limbs beautifully banded; the tarse dusky posteriorly. Throat and breast blackish; the tuberculated belly and thighs tinged with yellow. Sides black, continued in a straight line from the nostrils and eye, and strongly contrasting with a bright pale golden edge above. Hab. Pegu.

E. CARNATICUM is identified from a drawing sent by Mr. Jerdon, and the same species was procured by Capt. R. Tytler (38th N. I.) at Dacca, and by Mr. Theobald in Birbhúm.

* "POLYPORUS. *Sect. Apus, (Fries, Syst., p.* 359).

"P. MELADERMA, *Durus, pileo dilatato inæquabiliatrato, margine porisque canescentibus.*

"The size is remarkable; although not unprecedented. P. SQUAMOSUS has been met with in Scotland with a circumference of 7 feet 5 inches, and weighing 34lb avoirdupois; and P. FRAXINEUS has been met with in England measuring the enormous size of 42 inches across: the same dimensions in the Asám species being 35 inches. I have made a detailed description of it."—*H. F.*

various classes, of species either quite new to the museum, or hitherto imperfectly represented in our collections.

Among the mammalia, is a fine skin of the Indian Wolf, CANIS PALLIPES, Sykes:* some good Bats in spirit; comprising RHINOLOPHUS MINOR (?), Horsfield (v. *lepidus*, nobis, *passim*, vide *J. A. S.* XXI, 347); HIPPOSIDEROS CINERACEUS, nobis, *J. A. S.* XXII, 410; MYOTIS PALLIDIVENTRIS, (Hodgson), vide *J. A. S.* XXII, 581), from Kashmir; LASIURUS PEARSONI, Horsfield (*Vesp. lasyura*, Hodgson), from the vicinity of Darjiling; and others: skull of ERINACEUS COLLARIS, Gray (vide *J. A. S.* XXII, 582).† Specimen of SORICULUS NIGRESCENS, (Gray, v. *Sorex sikkimmensis*, Hodgson):‡ GERBILLUS INDICUS, from Monghyr; MUS GERBILLINUS, nobis, *J. A. S.* XXII, 410 (to which *M. Theobaldi*, nobis, XXII, 583, must be referred as a synonyme); M. OLERACEUS, Sykes (or a nearly affined species, perhaps M. DUMETICOLA, Hodgson, if not also M. POVENSIS, Hodgson, *Ann. Mag. N. H.*, XV, 268-9,—merely differing from M. OLERACEUS of S. Iudia and also of Asám by having the upper-parts less brightly coloured,—length of male $3\frac{1}{8}$ in.; tail $4\frac{3}{8}$ in.; *planta* $\frac{3}{4}$ in.);

* The Society's museum now contains good and characteristic examples of the skulls of the European, Indian, and Tibetan Wolves (CANIS LUPUS, L., C. PALLIPS, Sykes, and CANIS-*Lupus*-LANIGER, Hodgson); and the specifical distinctions appear to be well marked. The European is the largest of the three, with proportionally much larger and more powerful teeth, and the orbital process of the frontal bone is much less developed than in the others, as likewise the lamdoidal and sagittal crests. The Indian and Tibetan are more nearly affined than either is to the European.

† The E. MICROPUS, nobis, *l. c.*, has since been designated *E. nudiventer* by Dr. Horsfield, in his catalogue of the specimens of mammalia in the India-house museum (1851).

‡ This species was long ago sent from Nepal, by Mr. Hodgson, to the museum of this Society, and also (it would appear) to the British Museum, by the name SOREX SOCCATUS; which Dr. Gray consequently cites as a synonyme: and as another synonyme he correctly gives *S. aterrimus*, mentioned *J. A. S.* XII, 128: but Mr. Hodgson has since *described* a very different species, appertaining to a different group of Shrews, by the name S. SOCCATUS, and to which it is more intelligibly applicable. Of his specimen sent to this museum by that name, and also of the identical specimen on which we had previously bestowed the *M. S.* name *aterrimus*, we still possess the skulls. The dentition is that of CROSSOPUS, and not of CORSIRA (to which group Dr. Gray assigns the species); but this common little Sikim Shrew does not exhibit the modifications for aquatic habits which are characteristic of CROSSOPUS, Wagler.

from Monghyr district; and M. SPINULOSUS, *n. s.*,* from the Punjab: heads, and a skin of the female, of OVIS VIGNEI (mistaken for the very different O. MONTANA, Geoff., in Major A. Cunningham's 'Ladak');† and horns for exhibition to the meeting of the *Honglu* or Stag of Kashmir, and of the *Shou* or Tibetan Stag.

Of the former, are one loose pair, and three odd horns; and we have also the pleasure to exhibit a fine frontlet of the same species, sent for exhibition to the meeting by Major A. Broome; and the noble frontlet of C. CANADENSIS figured in *J. A. S.* XXII, No. 7.

A glance suffices to shew that the three are distinct species: the Kashmirian being a smaller Stag than the Tibetan, and more nearly affined to the British Red Deer, or C. ELAPHUS: bearing horns of a size to suit the Persian *Maral*, which we saw alive in London, and which is most probably the same animal. Indeed, from the series under inspection, it may fairly be inferred that some horns of the adult Kashmirian Stag would be undistinguishable from some horns of the European Stag: though, generally, the Kashmirian are larger, with less ramifying crown; but scarcely larger than some from the German forests,‡ and especially than European fossil specimens, considered without doubt to belong to ELAPHUS: these large European specimens, however, have much finer crowns than hitherto appear to have been met with in the Stag of Kashmir. In all, even the finest, horns of the Tibetan Stag hitherto obtained, the crown consists of a simple bifurcation, exhibiting no tendency to ramify further. In those of five individuals of the Kashmirian Stag under review, the crowns of three trifurcate, but without shewing a tendency to further subdivision; and the beam is less abruptly bent at the origin of the median or royal antler, than in the Tibetan *Shou*.§ In Major Broome's

* MUS SPINULOSUS, nobis. Nearly affined to M. PLATYTHRIX, Sykes; but of a dark dusky colour above, with fulvous tips to the softer fur: below, and all the feet, whitish. Upper rodential tusks orange, the lower white. Whiskers long and fine, the posterior and longer of them black for the basal half or more, the rest white. Length of adult male (in spirit), 3¾ in.; tail 3 in. (about, the extreme tip wanting in the specimen); planta, ⅞ in.

† O. MONTANA is the N. American representative of O. AMMON; of the same size, but with still more massive horns, bulging more between the angles; also with much black on the front of the neck, where O. AMMON is white.

‡ *Vide* description of a pair, in *J. A. S.* X, 749.

§ *Vide* Major Cunningham's representation of simply bifurcating horns of the Kashmir Stag, 'Ladák,' &c. pl. VII. Also figs. 8 and 9 of plate to *J. A. S.* X, 750. And compare these with Mr. Hodgson's highly characteristic figure of the

specimen of the Kashmirian Stag, the prongs of the trifurcate crown are remarkably elongated, the crown subdividing low: and this pair has very much the character of a fine pair of Red Deer horns, and might well pass as such among connoisseurs familiar with the latter. In one of Mr. Theobald's specimens, there is considerable flattening at the crown; and in another, with bifurcate summit, the posterior prong is elongated and much flattened. Lt. Speke, of the 46th N. I., who has himself shot many Kashmir Stags, was astonished at the size of the C. CANADENSIS frontlet and horns before the meeting, which he declared were out of all proportion too large for any *Honglu;* but Mr. Hodgson's largest *Shou* horns would appear to equal those of the *Wapiti;* and the Tibetan animal certainly approaches the N. American in size and general character, while the Kashmirian more approximates the European. It will probably be found, however, that the bez-antler is of more regular and constant occurrence in the Kashmirian than in the European Stag; for it is frequently wanting in good-sized specimens of the latter, as it constantly is in those of C. BARBARUS of the Atlas range, wherein the crown commonly bifurcates and sometimes trifurcates. The Kashmirian Stag, recognised as a distinct species, and if identical with the Persian *Maral* (as there is every reason to suppose), will stand as C. CASPIANUS, Falconer, apud Gray; and if distinct from the *Maral*, as C. CASHMERIENSIS, Falconer, apud Gray.*

horns of the Tibetan Stag, in *J. A. S.* X, 722, pl. ; where designated CERVUS AFFINIS.—Since writing this, we have had figures taken of all the Kashmirian horns exhibited to the meeting, *vide* pl.

* *List of Osteological specimens in the British Museum*, pp. 65, 147 (1847). In his subsequently published 'Synopsis of the species of Deer' *(Ann. Mag. N. H.*, 2nd series, IX, 419), Dr. J. E. Gray identifies the Persian *Maral* and Kashmirian *Honglu*, but applies to them the name C. PYGARGUS, Hardwicke, with C. *Wallichii* as a synonyme, under the mistaken supposition that the Tibetan *Shou* has not the white caudal disk. This nomenclature cannot be conceded. The name PYGARGUS was never bestowed by Gen. Hardwicke; but he erroneously identified his Tibetan Stag with C. PYGARGUS, Pallas, or the Siberian Roe; a widely different animal. *Vide Trans. Lin. Soc.* XIV, 581. It does not appear that Gen. Hardwicke's paper on this animal was even published; but a brief abstract of it is given *l. c.*, stating it to be "a native of the snowy mountains and plains of Muktinauth, about five weeks journey from the valley of Nepal, in a north-west direction.* The subject examined was a full grown male, 7 ft. 8 in.

* Muktinauth is not far from the famous Dwalgiri; but on the opposite or eastern side of the Gunduk river, and lies to the north of the great Himalayan range. Vide Allen's Map of India.

The only fragments of a bird-skin worthy of notice are the wing and leg of an undescribed species of Gallinule, from the Punjab Salt Range: apparently and doubtless the same as one which we could never identify, as represented in two coloured figures among the drawings of the late Sir A. Burnes, who obtained his specimens in Kabul. He terms it "*Kushkul*: 1 ft. long; 2 ft. from tip to tip." The species seems intermediate to the common GALLINULA CHLOROPUS and PORZANA AKOOL, (Sykes); and like the latter has no white under the tail, while it agrees with the common Gallinule in the colouring of the head and neck. The specimen of a closed wing presented by Mr. Theobald measures $6\frac{3}{8}$ in. in length, and is remarkable for having the outer web of the first primary wholly white, as also a broad white border to the outermost and largest feather of the winglet; while the coverts are of a dark slaty ash-colour, instead of being olivaceous (as in both the species cited.) The tarse measures $2\frac{1}{5}$ in.; middle toe and claw $2\frac{3}{8}$ in., the latter but $\frac{7}{16}$ in.; all the claws being much shorter, finer, and of a paler colour, than in many specimens examined of G. CHLOROPUS. Burnes's figures represent a GALLINULA, rather than a PORZANA; with pale crimson irides, and legs and feet apparently of

in length from the tip of the upper lip to the extremity of the very short tail, and 4 ft. 3 in. in height." A more detailed description exists among the Hardwicke *MSS.* in the British Museum, from which we derived the brief notice and measurements published in *J. A. S.* X, 745, which differ somewhat from the preceding:* and accordingly Mr. Hodgson is mistaken in supposing (*J. A. S.* XX, 593), that the name WALLICHII rests solely upon the authority of a native drawing, a copy of which was published by F. Cuvier.

According to Dr. Gray, "the skull of Dr. Falconer's Kashmir Stag is 15 in. long; the suborbital pit is oblong, triangular, and rather deep. The skull and horns are very like to Mr. Hodgson's specimen of C. AFFINIS (WALLICHII), *but they are considerably smaller.*

"Sir John McNeill informs us," he continues, "that they are called by the Persians *Maral*, or *Geoge*, or *Gookoohee*, and the species is frequently noticed in their literature. It is found in all the wooded mountain districts of Persia, but apparently does not occur in the central parts of that country. They rarely descend into the plains. During the summer they are found in the highest wooded parts of the mountains; and during the winter in the lower ravines, near their bases, where they are frequently tracked in the snow. *The horns of the adult males closely resemble those of the adult males of the British Red Deer; insomuch that I doubt whether an unscientific observer could distinguish them, except by the superior size of those of the Maral.*"

* Compare both with those of the *Wapiti*, taken also from the living animal, in *J. A. S.* X, 738.

the same colour as in the common Gallinule, the orange *garter*, however, less developed. Beak also coloured as in G. CHLOROPUS, but much more slender; and if the colouring can be relied upon, the red passes further along the upper mandible, and the yellow further back upon the lower mandible, while the frontal shield is small. There is also no representation in either figure of the white markings of the flanks conspicuous in the common Gallinule, and which the artist could scarcely fail to have represented, had they existed in the specimens before him. Convinced, therefore, that a peculiar and distinct species is represented, we shall provisionally name it GALLINULA BURNESII.

Mr. Theobald has also presented nests of ORIOLUS KUNDOO, LANIUS HARDWICKII, and MUNIA MALABARICA: of which last species he observed the curious fact of two pairs of birds constructing a single ordinary nest in common, within a few yards of his tent, where he was encamped for several months continuously; and from another nest of the same species he took the extraordinary number of 25 eggs!* We are further indebted to him for eggs of the following species of birds:—BUTEO CANESCENS (RUFINUS?); POLIORNIS TISA; HALIAËTUS MACEI, NEOPHRON PERCNOPTERUS; OXYLOPHUS MELANOLEUCOS; CENTROPUS RUFIPENNIS; CORVUS CORAX (from Punjab Salt Range);† C. ———? (Kashmir hills); C. MONEDULA (Kashmir); ACRIDOTHERES TRISTIS; MUNIA MALABARICA; GALERIDA CRISTATA; MALACOCERCUS CAUDATUS; LANIUS LAHTORA; L. TEPHRONOTUS; L. HARDWICKII; THAMNOBIA CAMBAIENSIS; PYCNONOTUS CAFER? (*bengalensis*); P. HÆMORRHOUS; P. LEUCOTIS; NECTARINIA ASIATICA; TURTUR HUMILIS; AMMOPERDIX BONHAMI; CACCABIS CHUKAR; PERDIX PONTICERIANA; TURNIX OCELLATUS; SARCIOPHORUS BILOBUS; HERODIAS BUBULCUS; ARDEOLA LEUCOPTERA; GALLINULA CHLOROPUS (BURNESII?); FULICA ATRA (Kashmir); DERDROCYGNA AWSUREE; NETTAPUS COROMANDELIANUS; PODICEPS CRISTATUS (Kashmir); P. PHILIPPENSIS; and a few others, undetermined.

Of reptiles, Mr. Theobald has favored us with specimens of CYRTODACTYLUS MACULARIUS, *n. s.*, from the Punjab Salt Range; GYMNODACTYLUS GECKOIDES (*vide J. A. S.* XXII, 410), from ditto; HEMIDACTYLUS LESCHENAULTII, D. and B., from ditto; STELLIO CYANOGASTER, Ruppell (*vide J. A. S.* XXII, 646), from Kashmir; LAUDAKIA (?) MELANURA, *n. s.*, Kashmir (?); CHARASIA DORSALIS, Gray, from Birbhum; AGAMA

* According to Col. Sykes, this species (his *Lonchura cheet*) sometimes takes possession of the deserted nests of PLOCEUS PHILIPPINUS (or more probably of PL. MANYAR). *Proc. Zool. Soc.* 1832, p. 95.

† *Vide* p. 218, *ante*.

AGILIS, Olivier (*Trapelus flavimaculatus*, Ruppell, or a most closely affined species), from the Punjab Salt Range; CALOTES TRICARINATUS, (*J. A. S.* XXII, 652), Darjiling;* ACANTHODACTYLUS VULGARIS, Dumeril and Bibron, Punjab Salt Range;† MOCOA SIKIMMENSIS (*J. A. S.* XXII, 652), Kashmir (!); EURYLEPIS TÆNIOLATUS, *n. s. et g.*, Punjab Salt Range; TORTRIX ERYX (*Eryx indica*, Gray), ditto; CALAMARIA FUSCA (*J. A. S.* XXIII, 288), Darjiling; CORONELLA CALLICEPHALUS, Gray (XXIII, 289), ditto; COLUBER VITTACAUDATUS, *n. s.*, ditto; TROPIDONOTUS DIPSAS, var.‡ (*J. A. S.* XXIII, 297), ditto; and VIPERA ECHIS, *Ind. var.* (remarkably fine), from the Punjab Salt Range.§

* Several specimens are all of the same small size as the example originally described.

† Figured by Savigny, *Rept. d'Egypt, Supp.* pl. 1, f. 9.—*N. B.* The Ac. NILGHERRIENSIS, Jerdon, *J. A. S.* XXII, 476, is an EREMIAS, Fitzinger.

‡ Almost plain blackish above, buffy-white below, with a lateral row of black spots,—one near the margin of each abdominal scuta, beginning from about a fourth of the entire length; a whitish V-like mark behind the occiput.

§ CYRTODACTYLUS MACULARIUS, nobis, *n. s.* Apparently affined to C. MARMORATUS, (Kubl), of the Malay countries; with tail granular beneath, as in that species: scales on throat minute, becoming gradually larger to the abdomen. The very young have probably the crown black; a broad black band across the nape; two others upon the body, between the fore and hind-limbs; another where the hind-limbs are articulated; and three more upon the tail, besides its black tip: the inter-spaces being of a fine rosy-carneous hue, with a few black tubercles interspersed among the numerous pale tubercles: limbs and under-parts spotless, on the former slightly marked. In a specimen not half-grown, the interior of the black bands is pale and speckled with black, the margins continuing black; and it is probable that the dark hue ultimately disappears from the interior of the patches. In the specimen under examination, the dark hue appears to have almost left the crown, its blackish margin only remaining, as a streak from the nostril through the eye and continued round to join its opposite upon the occiput: crown and cheeks mottled with dark spots more or less confluent; and the interspace from the occiput to the nape-band has many black tubercles. The length of this young specimen (which had lost and renewed its tail-tip) is $3\frac{1}{8}$ in. from snout to vent: but Mr. Theobald informs us that the species attains more than double the size, and when alive is remarkable for the beauty of its prevailing rosy-carneous hue. It probably attains the size of C. PULCHELLUS. From the Punjab Salt Range.

LAUDAKIA (?) MELANURA, nobis, *n. s.* A well marked second species of Dr. Gray's genus LAUDAKIA, founded on the AGAMA TUBERCULATA of Hardwicke's *Ill. Ind. Zool.*; if not, rather, a new genus affined to LAUDAKIA (in which case this may bear the name PLOCEDERMA, nobis). Head and body flat, or depressed: the tail more than twice the length of the head and body; and slender, except towards its base, where depressed and broad. Longest fore-toe reaching to the vent: longest hind-toe to the eye. Tympana large and round; their circum-

The occurrence of certain of these reptiles in Kashmir and upon the Punjab Salt Range is highly interesting; as especially GYMNODACTYLUS

ference partly concealed by surrounding tuberculated plaits or folds. A glandulous pit above the shoulder, black within; and thence a small plait is continued back over the shoulder to the flank, where followed by another and smaller one; there is also a lateral fold or plait from fore to hind-limb, margining the abdominal surface. Two transverse folds on the throat; the anterior of which is a double or cross-fold: continued upward into a complication of sundry folds or plaits on the sides of the neck, and there are others above the axilla. A slight appearance of crest on the nape only. Head covered with smooth round or hexagonal scales, in general convex, flat upon the orbits, and obtusely keeled transversely upon the sinciput. Scales of the back imbricated, keeled; largest along the middle, and gradually smaller to the sides, where minute: those upon the tumid base of the tail very large, with prominent keels terminating each in a raised point; save on the under surface, where they are pointed but not keeled: the long slender portion of the tail is clad with similar but small scales: those on the upper and posterior surface of the limbs are keeled, with acute points, like those of the tail: and those of the lower-parts are small, hexagonal, and smooth. On the abdominal region is a patch of rather larger and glandulous scales, much less developed than in L. TUBERCULATA, and placed much lower down (nearer the hind-limbs) than in Hardwicke's published figure of that species: another and præ-anal patch of the same, not very distinct; but the vent is bordered with a ridge of minute scales anteriorly, and posteriorly with a crescent-like patch of the same, beyond which is a remarkable depression like a false vent. On the folds about the tympana, sides of the neck, and axillæ, also on some transverse folds upon the base of the hind-limbs posteriorly, and one above the base of the hind-limb on its dorsal aspect, are some rather larger and tubercular scales: but not any of these are interspersed over the body, as in L. TUBERCULATA. Colour (in spirit) olive-grey; probably olive-green and changeable when alive; the head and body speckled over with dark scales, and also with some scales paler than the rest: the long slender portion of the tail dusky black: and the lower-parts pale or buffy white, apparently suffused with crimson when alive; the throat and below the shoulders beautifully marbled with greyish-black, probably blue in the living animal. Entire length of specimen 11 in.; of which tail $7\frac{3}{4}$ in.: and hind-limb $2\frac{5}{8}$ in. Habitat uncertain; but believed to be Kashmir.

EURYLEPIS, nobis, *n. g.* Affined to THYRUS, Gray (founded on the GONGYLUS OCELLATUS, D. and B.) Body fusiform, depressed; with rather small limbs, five-toed, the first and fifth toe of the hind-foot short and the fourth longest. Tail longer than the head and body, cylindrical and evenly tapering. Head pyramidal; the scutation as figured by Savigny of his *Anlois pavé (Descr. Egypt., Nat. Hist., Rept.* t. 4, f. 4, *v. Scincus multiseriatus*, Cuv., *R. A., et Sc. pavimentatus*, Is. Geoff.; but undescribed by M. M. Dumeril and Bibron, who doubtfully identify it with EUPREPIS SEPTEMTÆNIATUS, Reuss,—*Hist. Rept.* v, 682). Nostrils lateral, pierced in a small separate nasal scuta. A translucent disk to the lower eye-lid. Tympana sunk: the auditory orifice serrated anteriorly. Palatal incision

GECKOIDES, STELLIO CYANIGASTER, AGAMA AGILIS, and ACANTHODACTYLUS VULGARIS. Mr. Theobald's shells consist chiefly of well known species, and include a fine series of the Afghan BULIMUS SPELÆUS, Hutton, from the Salt Range.

E. BLYTH.

rather large. Two great præ-anal scales, obliquely separated. All the scales quite smooth, without trace of keels. A remarkable character consists in a series of very wide (but longitudinally narrow) scales along the middle of the back, continued from above the articulation of the fore to that of the hind-limbs; beyond which either way they are represented by an alternately double series, hexagonal, and similar to the scales on the other parts. There are two lateral series of dorsal scales on either side of the broad medial series; three additional series on the sides of the body; and eight abdominal series: all longitudinal. Along the middle of the tail underneath is also a series of broad scales, and ten other longitudinal series surrounding the tail. The scales of the upper-parts are conspicuously distinct apart; those of the under-parts less so. Scales upon the limbs smaller than the rest, but otherwise similar. No femoral pores.

EU. TÆNIOLATUS, nobis, *n. s.* Pale olive-grey above, with three pale-spotted dark bands more or less distinct, reaching backward as far as the hind-limbs; and the tail more or less speckled with dusky-black: under-parts spotless dull-white. In the young, these markings are much more intensely brought out: the medial dorsal band is less broad than the series of wide medial dorsal scales along which it runs, and also than the lateral bands; and the tail is brightly spotted throughout, except along its under surface. Length of adult 9 in., of which the tail (from vent) is $5\frac{1}{4}$ in.; fore-limb $\frac{3}{4}$ in., reaching to the fore-part of the eye; and hind-limb, 1 in.: distance from fore to hind-limb $2\frac{3}{8}$ in. This handsome Scink is common in the Alpine Punjab.

COLUBER VITTACAUDATUS, nobis, *n. s.* Affined to C. FASCIOLATUS, Shaw. Vertical plate pentagonal, with obtuse posterior apex. A single frænal. Nineteen rows of scales. Abdominal scutæ, 220: caudal scutellæ, 95 pairs. Ground-colour olive, paler below: a broad black streak behind each eye, not continued on to the neck, and hardly shewing anterior to the eye: rest of head and neck without markings. Tail short, with four longitudiual black bands on a whitish ground: anterior to the vent, the upper band on each side becomes much broader, and is crossed with numerous pale striæ, more or less distinct; which, at about the second posterior fifth of the entire length of the animal, coalesce and unite to form a lateral pale band, more or less broken and continued forward to the neck: above and below this irregular pale band, are series of black elongated diamond squares, pale-centred excepting those towards the neck; the upper series of these squares uniting, each with its opposite, leave a series of lengthened oval pale spots along the middle of the back, continued (from about the third-fifth of the length of the animal) as an unbroken pale-band to the end of the tail. Lower-parts pale, mottled with black, resolving into two dark lines upon a pale ground, along the posterior two-fifths of the entire length. Length of specimen, 19 in.; of which tail, $3\frac{1}{2}$ in. From the vicinity of Darjiling.

LIBRARY.

The following additions have been made to the library since September last.

Presented.

Magnetical and Meteorological Observations made at the Hon'ble East India Company's Observatory, Bombay, in the year 1851. Bombay, 1854, 4to.—BY THE RIGHT HON'BLE THE GOVERNOR IN COUNCIL OF BOMBAY.

Parabole de l'enfant Egaré formant le chapetre IV. du Lotus de la Bonne Loì, Par P. E. Foucaux. Paris, 1854, 8vo.—BY THE AUTHOR.

Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. Deel XXV.—BY THE BATAVIAN SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch Indie. Deel VI. Aflevering V. and VI.—BY THE SAME.

Tijdschrift voor Indische Taal,—Land,—en Volkenkunde, Jahrgang III.—BY THE SAME.

Anglo-Burmese Hand-Book, or a Guide to a practical knowledge of the Burmese language, compiled by Dr. A. Chase, Maulmein, 1852, oblong 12mo.—BY THE AUTHOR.

Lexicon Geographicum cui titulus est مراصد الاعلاع على اسماء الامكنه و البقا octavum fasciculum, edidit T. G. J. Juynboil, Lugduni Batavorum 1854.—BY THE EDITOR.

Selections from the Records of the Government of the North Western Provinces, part XV.—BY THE GOVERNMENT OF THE N. W. P.

Selections from the Records of the Government of India (Home Dept.) No. V.—BY THE GOVERNMENT OF INDIA.

Ditto ditto, Foreign Department, No. IV.—BY THE SAME.

Report on the Revenue Administration of the Districts comprised in the Hazaribaugh Division or South-West Frontier Agency, for 1851-52. —BY THE GOVERNMENT OF BENGAL.

A Short Account of the Ganges Canal.—BY LIEUT.-COL. W. E. BAKER.

Proceedings of the Royal Society, Vol. VII. No. 5.—BY THE SOCIETY.

The Upadeshak, No. 94.—BY THE EDITOR.

The Bibidhártha Sangraha, No. 30.—BY THE EDITOR.

The Tattwabodhiní Patriká, No. 133.—BY THE TATTWABODHINÍ SOBHA'.

The Calcutta Christian Observer, 1854.—BY THE EDITORS.

The Oriental Baptist, No. 94.—BY THE EDITOR.

The Oriental Christian Spectator, No. for September, 1854.—BY THE EDITOR.

The Citizen for August and September last.—BY THE EDITOR.

The Doorbeen, a Persian Newspaper, for September, 1854.—BY THE EDITOR.

Exchanged.

The Athenæum, for July, 1854.
The London, Edinburgh and Dublin Philosophical Magazine, No. 50.
The Calcutta Review, No. 45.

Purchased.

Journal des Savants, for July, 1854.
Comptes Rendus, Nos. 1 and 2, for July, 1854.
The Annals and Magazine of Natural History, No. 80.
Chúrnak, 12mo.
Casheenath's System of Logic, 8vo.
Neelratna's Bohoodarsan, 8vo.
Rammohun Roy's Bengali Grammar, 8vo.
Padánka Duta, 12mo.
Átmatattwa Vidyá, 12mo.
Morton's Proverbs, 8vo.
Hatem Tai, in Bengali, 4to.
Sháhnámeh, in Bengali, 4to.

Rá'jendrala'l Mittra.

For November, 1854.

At a meeting of the Asiatic Society held on the 1st inst. at half-past 8 p. m.

Sir James Colvile, Kt. President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From the Imperial Academy of Sciences of Vienna, all the publications of the Academy (for detail, vide Library report).

2. From the Royal University of Christiania, all the publications of the University (for detail, vide Library report).

3. From Lt. Col. Baker on the part of R. M. Stephenson, Esq. managing director, E. I. Railway, the following specimens of iron ores, viz. (1) A specimen of coal from Natal, Cape of Good Hope; (2) Specimens of iron ore from Nagpoor, with a memorandum by the Rev. J. Hislop; (3) Specimens of iron and iron ore from the neighbourhood of Poona, &c. in Nimar, with a sample of the iron manufactured therefrom; (4) Specimens of iron and iron ore from near

Midnapore, with sample of the iron manufactured thereform; (5) Specimens of iron ore and crude iron from 20 miles north of Doya on the More River, Beerbhoom.

4. From Lt.-Col. Baker, a plan of the town and ruins of Rajmahal, showing the site of the proposed Railway Terminus at that station.

5. From C. Grant, Esq. (1) a specimen of coal from Moukmeanouth Colliery Pit, in Durham, (2) specimens of Shale with impressions of ferns, (3) specimens of embedded fresh water mussel, (4) an Ammonite from Whitby and (5) a specimen of iron stone from Dysart in Fifeshire.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

G. H. Bushby, Esq. C. S. (re-elected).

F. A. Lushington, Esq. C. S. (ditto).

Dr. Boycott, Bombay Medical service.

Lt. N. W. Elphinstone, 4th Regt. N. I.

Lt. H. S. Bivar, 18th Regt. B. N. I.

The following were named for ballot at the next meeting.

G. G. Morris, Esq. C. S., Purneah, proposed by Mr. Grote, and seconded by the President.

Capt. G. H. Saxton, 38th M. N. I. proposed by Mr. Samuells and seconded by Dr. Spilsbury.

Bábu Kissory Chand Mittra, Junr. Magistrate, Calcutta, proposed by Bábu Ramgopaul Ghose and seconded by Bábu Rádánáth Sickdar.

Communications were received—

1. From Dr. Röer, enclosing a paper on the Bibliographical history of the Upanishads.

2. From the Government of the North Western Provinces, through Mr. Under-Secretary Carmichael, Meteorological Register kept at the Secretariat Office at Agra, for the month of September last.

3. From Major A. Cunningham, forwarding a paper entitled "Coins of Indian Buddhist Satraps with Greek Inscriptions."

The following is an extract from Major C.

"When I formerly told you that I thought I could give some information on points that would be interesting to your brother, I meant re-

garding Alexander the Great himself, and not about his successors. Two of these points you will find in the present paper; one about Porus being a descendant of Jajâti and therefore *a Paurava*, the other about the kings being Μωριεις, which establishes the fact of Chandra Gupta being contemporaneous with Alexander the Great. I will now add three points in the Geography; 1st, *Shor-kat* (the capital of the Pergunnah of *Shor* in Akbar's time) was the ancient *Alexandria Sorianè;* 2nd, The Ravi formerly ran past Multan into the Chenab; in fact it completely encircled the Fort, which agrees with what is recorded by the Greeks of the metropolis of the Malli—'Alexander sailed round it.' The old bed is traceable the whole way from Serai Sidhu to Multan; 3rd, The Alexandria founded by Leonatus on the borders of Gedrosia was *Alexandria Melanè;* now Ras Malan on the sea coast.

"I have made some most beautiful discoveries regarding the early wanderings of the Solar and Lunar races, which will be rather startling perhaps at first, but they are nevertheless quite true. Their interest depends on the intimate connexion between them and the dominant races of the west. Thus the Thracians and Macedonians were descended from the same stock as the Afghans. This is not a conjecture, but a plain fact susceptible of *proof.* Suppose we should come upon some people in a distant country living on the banks of a 'River Thames' who called themselves 'men of Kent' and Kentish men, what would be the inference? The Afghans, as you are aware, call themselves *Pashtun* and *Pakhtun* (Pathun or Pathán) and they live on the river Indus or *Abi-sindh!* Now in Thrace there was a river called Αψινθος, on whose banks live the Βιστονιος from whom Βειθυνοι of Bothynia ackuowledged their descent. Here then we have both *Beitun* and *Bistun* on the Assinthus River.

"This is one proof out of many. The Thracians and Bithynians had cities called *Nysa,* with the worship of Dionysus, as had also the people of the Kabul river. I have traced the connecting links of the chain from the Indus to the Atlantic, and I think that I can establish the migration of the Solar race through all the countries which they must have visited. Thus the *Kaspaturos* or Kas Pakturas of India re-appears in *Katapatuka* (or Cappadocia) in *Karpathos* Insula, and in the Karpathee montes, or modern *Krapack.* This subject alone will require a single volume.

"But it is the religiou, and uot the Geography, that affords the most interesting illustrations. Thus Alexander's historians relate that Abbissares that is the king of *Sabissa* kept a huge dragon, and that Taxiles kept another, whose worship was similar to that of Dionysus. Remembering that Sabazios is a name of Dionysus; and that *Sabas* is the name of a snake in

the Alphine dialects of the Punjab, we see the connexion between Dionysus with his snakes in baskets and the god *Sabazias;* we see also how the Greek Σαβαζειν was formed as it evidently meant to call out 'Shabash,' so also Σεβος &c. &c. as the priests of Baal called out "O Baal! hear us!" That snake-worship was formerly dominant in India, we all know, but no one has yet attempted to trace it. This I am now doing, but, before writing, I wish to read all that has been written upon snake-worship by European authors, not one of those that I have yet read, has even the faintest idea of its true origin. My illustrations on this subject are most complete, and they most unexpectedly point out the object of Stonehenge and the other stone circles of Britain."

The Librarian and the Curator of the Museum of Economic Geology submitted their usual monthly reports.

Report of the Curator Museum of Economic Geology, November, 1854.

I usually delay reporting upon contributions till I have examined them, but illness and the number of contributions, with many miscellaneous duties and calls, and some very long and intricate researches which I have been following out, have thrown me so much in arrears that I must unwillingly break through my custom and mention only many contributions which I could wish to have examined before doing so.

Geology and Mineralogy.—We have received a box of 45 specimens, mostly rocks, from the Coromandel Coast, by a Madras ship; but I have no notice from the donor, nor do I recognise the hand-writing. I have catalogued the localities but have not yet examined them.

We have also received from Mr. Blyth a bottle of Petroleum from Mooltan, also from an unknown donor.

Mr. Oldham's valuable contribution was exhibited at the October meeting, and it is described in the following letter by him.

From the Superintendent of the Geological Survey to the Secretary, Asiatic Society of Bengal.

Dated 13th September, 1854.

Sir,—I have the honor to forward herewith, for the Museum of Economic Geology some boxes of specimens both Geological and Palæontological, which will, I hope, be found valuable additions to its collections.

They consist principally of a fine collection of fossil plants from the Rajmahal hills.

Some rock specimens from ditto ditto.

Ditto ditto from Khasi Hills.

Iron ores and iron from ditto ditto.
Iron ore from Birbhoom.
Tin ore and tin from Tenasserim Provinces.
Iron ditto from Tavoy.
Coal from Namdang in Assam.

I have the honor to be, Sir,
Your most obedient servant,
(Signed) Thos. Oldham.

Mr. W. Theobald, Junior, has obliged us with a number of rock specimens from the Punjab, which are not yet examined, nor has any catalogue of them been received.

Major Ramsay, resident of Katmandoo has again obliged us by soliciting and obtaining from H. E. the Minister Jung Bahadoor some very handsome specimens of Nepaulite, with its melted ores, some of which is on the table, and a box of the products of a different mine, which will be examined and reported on in due time, as they require a careful investigation.

We have received from Captain W. S. Sherwill of the Revenue Survey a small Meteorite, of the fall of which, with a number of others, the following extract of a letter from him, gives an account.

" By to-day's Dawk Banghy, I have despatched to your address, and for presentation to the Asiatic Society's Museum, a tin case containing a small Aerolite that fell from the heavens near to the small Military station of Segowlee on the Katmandoo road, and 20 miles from the foot of the outer or lower Himalayas. It was given to me lately when I was at Moteeharee, which is near Segowlee, by Mr. F. A. Glover of the Civil Service, Joint-Magistrate of Chumparun, who also kindly gave me the following description of its fall.

" 'The stone or rather stones, for there were several, (I saw five or six) fell about mid-day of the 4th March, 1853, no noise accompanied their fall; nor were they *seen* falling; a man and a boy who were engaged in the fields were startled by hearing heavy thumps on the ground caused by the falling stones, they picked up the stones and brought them to their village,* from whence they were taken by some of the Irregular Cavalry Sowars to Segowlee. The adjutant of the corps, Lieut. Macdougall gave me one large stone, and I procured two smaller ones (one of which I gave you) from the village near which they fell.'

" There seems to be no reasonable doubt but that the stones fell as

* A small village a few miles South of Segowlee.—W. S. S.

stated, though this certainly rests on native testimony merely; but in this case, no object could be gained by falsehood.

"The nearest rock to the spot is 20 miles in a northerly direction as the crow flies.

(Signed) "W. S. Sherwill."

Patna, 24th November, 1854.

The stone is undoubtedly a Meteorite, but we cannot afford to break this valuable little specimen to obtain a large fracture; we can only then, judging from the small chips taken off, say that it greatly resembles Dr. Tytler's Meteorites which also fell with a great number of others near Allahabad some thirty or forty years ago.

Economic Geology.

Our acquisitions here are very numerous and rich, and one of them indeed probably of immense importance.

Captain Hannay's iron ores and paper on the history of iron in Assam have already been before the Society.

The Kumaon iron ores of Lt.-Col. Drummond with his memorandum, and those from Mr. Stephenson presented through Lt.-Col. Baker have been already brought forward at a late meeting.

Mr. Taylor of Burdwan has obliged as with some fine specimens of the iron ores of Burdwan.

Mr. Allen of the N. W. Dawk Company has sent for examination some supposed copper ore or *gossan* from the neighbourhood of Simla. It proves however to be a soft ferruginous shale without any trace of copper.

I said above that one of our acquisitions in this department is of immense importance; and this will be understood when I say that, after some difficulty, I have at length procured through the kindness of Capt. Niblett of the H. C. Steamer Sesostris, a bag of the Ava coal which we some time ago saw announced in the newspapers, and that upon examination it proves to be a first rate Steam coal, equal to some of the best Welsh Steam coals, the Pont-y-pool and another, which it almost exactly resembles. I have been also able to ascertain from Major Burney's Ava specimens in our collection that the locality of this coal is the Kyendwen River which falls into the Irrawaddy a little above Yandaboo, about 200 miles from our frontier post Meaday; for a Jet coal from that locality of which also Captain Niblett has brought us some very inferior specimens, was analysed by Mr. James Prinsep and of this there are also specimens in Major Burney's collection

but (probably from there being only one specimen of our fine bituminous looking coal) he has not analysed it; and it is a curious comment on the importance of the old collections, and those from distant countries, that at the distance of nearly a quarter of a century they should afford us not only this information, but also serve to put us on our guard when we attempt to pronounce on the value of the coal; for had only our inferior Jet coal been brought to us, we should have pronounced it as nearly worthless, which it is as a steam coal. Mr. Prinsep's jet coal will no doubt be found in time. Ours is probably a mere surface shale, though I can detect no organic remains.

The value of a really good steam coal, not only in Ava, but for all our sea-going steamers, whether public or private, I need not further remark upon.

H. Piddington.

The following additions have been made to the library since the October meeting.

Presented.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, mathematisch-naturwissenschaftliche Classe, Band I. Band VI. 5 heft, Band VII. heft I. Band IX. hefts III. to V. Bands X. and XI. Band XII. hefts I. @ IV. and a vol. of plates.—By the Imperial Academy of Vienna.

Ditto ditto, philosophisch-historische Classe. Band I. Band VII. 1. and 2 hefts. Band IX. hefts III. @ V. Band X. and XI. and XII. heft I. to IV.—By the Same.

Archiv für Kunde österreichischer Geschichtsquellen. Band I. @ XII —By the Same.

Fontes Rerum Austriacarum, Osterreichische Geschichts-quellen, vols. I. to VII.—By the Same.

Die Vegetationsverhältnisse von Iglau, von Alois Pokory. Wien, 1852, 8vo.—By the Same.

Genera et Species Plantarum Fossilium, auctore F. Unger. Vendobonae, 1850, 8vo.—By the Same.

Versuch einer Geschichte der Pflanzenwelt, von Dr. F. Unger. Wien, 1852, 8vo.—By the Same.

Systema Helminthum, auctore C. M. Diesing, 2 vols. 8vo.—By the Same.

Monumenta Habesburgica, vol. I.—By the Same.

Erster Bericht über die zur Dampfschriffahrt geeigneten Steinkohlen

England's. Von Sir Henry de la Beche und Dr. Lyon Plaifair, 8vo.—By the Same.

Das Mosaisch-rabbinische Civilrecht bearbeitet von H. B. Fassel, vol. I. 8vo.—By the Same.

Monumenta Linguae Palaeoslovenicae e Codice suprasliensi edidit F. Miklosich, 1 vol. 8vo.—By the Same.

Entwurf eines Meteorologischen Beobachtungs systems für die österreichische Monarchie, von Carl Kreil —By the Same.

Die Grotten und Höhlen von Adelsberg, Lueg, Planina und Laas. Von A. Schmidt, 1 vol. 8vo. with a vol. of plates.—By the Same.

Deutsche Gedichte des XI. und XII. Jahrhunderts, von J. Diemer. Wien, 1849, Rl. 8vo.—By the Same.

Notizenblatt, Beilage zum Archiv für Kunde österreichischerquellen, for 1851-52-53.—By the Same.

Die Kechua Sprache, von J. J. V. Tschudi, 2 vols. 8vo.—By the Same.

Almanach for 1851-52-53 and 54.—By the Same.

Die antiken Gold-und silber monumente des K. K. Münz und Antiken Cabinettes in Wien. Beschrieben von J. Arneth, folio 2 vols.—By the Same.

Die Alterthümer von Hallstatter Salzberg und Dessen Umgebung, von F. Simony, oblong folio.—By the Same.

Archæologische Analecten von J. Arneth, Wien, 1851, oblong folio.—By the Same.

Das Verbrüderungs Buch des stiftes S. Peter zu Salzburg von Th. G. V. Krajan, Wien, 1852, folio.—By the Same.

Denkschriften der Kaiserlichen Akademic der Wissenschaften, mathematisch-naturwissenschaftliche Classe, vols. IV. to VII —By the Same

Ditto ditto philosophisch-historische Classe, IV.-V. Band.—By the Same.

Intigration der Linearen Differential Gleichungen mit constanen und veranderlichen co-efficienten von Dr. J. Petzval, 2 parts, 4to.—By the Same.

Tafeln zu dem Portrage; der Polygraphische Apparat der K. K. Hof, und Staatsdruckerrei zu Wien, 8vo. pamphlet.—By the Same.

Regesten zur Geschichte der Markgrafen und Herzoge österriechs aus dem House Babenberg, von Andreas von Meiller, 4to.—By the Same.

Statistiske Tabeller for Kongeriget Norge, udgivne efter Foranstaltning af Departementet for det Indre, Ellevte Rakke.—By the Royal University of Christiania.

Jury Institutionen af Munch Ræder, 2 Bonds, 2 hefte.—By the Same.

Olaf den Helliges Saga und Snorre Sturlasson, Christiania, 1853.—By the Same.

Nyt Magazin for Naturvidenskaberne. 5 Nos. for 1853.—By the Same.

Barlaams og Josaphats Saga, Christiania, 1851, 8vo.—By the Same.

Olaf Tryggvesöns Saga ved odd Munk, Christiania, 1853, 8vo.—By the Same.

Det Kongelige Norske Frederiks Universitets Aarsberetning, for 1851, 12mo.—By the Same.

Berzeichnik der Verlags und Commissions Artikel von Carl Wilhem Leske in Darmstadt.—By the Same.

Syphilisationsforsög foretagne af W. Boeck, Christiania, 1853, 12mo.—By the Same.

Bidrag til Pectini branchiernes Udviklings Historie af J. Koron og D. C. Danielsen, Bengen, 2 8vo. pamplets.—By the Same.

Beretning om Kongeriget Norges ökonomiske Tilstand i aarene, 1846-50, Christiania, 1853, 4to.—By the Same.

Norsk Lappisk Ordbog, Af Nils Vebe Stoek fleth, Christiania, 1852, 8vo.—By the Same.

Strengleikar eda Liodabok af R. Keyser og C. R. Unger, Christiania, 1850, 8vo.—By the Same.

Om den Spidalske Sygdom Elephantiasis Græcorum af C. W. Boeck, Christiania, 1842, 8vo.—By the Same.

Natuurkundig Tijdschrift voor Nederlandseh Indie, Deel VII.

Monographie des Guepes Sociales, on de la Tribudes Vespiens, Par de Saussure, Nos. 1, 3, 4, 6.—By the Author.

Ethnology of the Indo-Pacific Islands, by J. R. Logan, 2 parts.—By the author.

The Indian Annals of Medical Science, No. III.—By the Editor.

Report on the Revenue Administration of the Province of Assam, for 1851-52.—By the Government of Bengal.

The Oriental Christian Spectator, for October, 1854.—By the Editor.

The Mineral Waters of India, with some hints on spas and sanataria. By J. McPherson, M. D.—By the Author.

Exchanged.

Calcutta Review, No. 45.

Purchased.

Bhaktitatwasára, 1 vol. 8vo.

Kabiranjan, 1 vol. 12mo.

Sarvajnyan Munjari, 1 vol. 12mo.
Golébakáwali, 1 vol. 12mo.
Gita Govinda, 1 vol. 8vo.
Ajnán Timiranáshaka, 1 vol. 8vo.
Chikitsárnab, 1 vol. 8vo.
Chaitanya Sangita, 1 vol. 8vo.
Uddhabadúta, 1 vol. 8vo.
Iblisnámeh, 1 vol. 8vo.
Nala Damayanti, 1 vol. 8vo.
Sárábali, 1 vol. 8vo.
Pákarájeswara, 1 vol. 8vo.
Párasya Itihása, 1 vol. 8vo.
Ánanda Lahari, 1 vol. 8vo.
Kálí Bilása, 1 vol. 8vo.
Purusha Paríkshá, 1 vol. 8vo.
Batris-sínghásan, 1 vol. 8vo.
Dandi Parba, 1 vol. 8vo.
Romeo and Juliet in Bengali, 1 vol. 12mo.
Kimiá Vídyá Sára, 1 vol. 12mo.
Saga-ullá, 1 vol. 8vo.
Satya Itihása Sára, 1 vol. 8vo.
Svaḍvinsat Bákhyán, 1 vol. 12mo.
Adbhuta Rámáyana, 1 vol. 12mo.
Sankar Sára, 1 vol. 8vo.
Cháhár-Durvesh, 1 vol. 8vo.

1*st Nov.*, 1854. RA'JENDRALA'L MITTRA.

FOR DECEMBER, 1854.

The Society met on the 6th instant at half-past 8 P. M.

SIR JAMES COLVILE, KT., President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From Captain T. C. Dalton, Debrughur, Assam, 10 silver coins of the Patan Sultans of Bengal (vide proceedings for September last).

2. From Bábu Rádhánáth Sikdár, 2 copies of the Másaik Patriká, No. IV.

3. From Mons. G. A. Durand, General Secretary to the Imperial Academy of Sciences at Bordeaux, the Journal of the Society for 1853-54.

4. From H. Piddington, Esq. copy of an Essay on Agricultural Science as a branch of Native Education.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

G. G. Morris, Esq. C. S.
Capt. G. A. Saxton, 38th M. N. I.
Bábu Kissorychand Mittra.

The Chairman on behalf of the Council gave notice of their intention, at the next anniversary meeting, to propose the following modification of Rule 6.

"Candidates for admission as ordinary members may be proposed by any ordinary member who has received authority from the candidate to propose him, and must be seconded by another ordinary member. The proposal shall be laid," &c. (the rest as in the old rule).

Read letters—

1. From Rev. J. Long, suggesting that the Society should recommend to the Government the propriety of preserving the ruins of Rajmahal from spoliation.

The following is an extract from Rev. J. Long's letter:

"The preservation of the most interesting part of the ruins of Rajmahal which was the capital of Bengal only two centuries ago, 'the city of one hundred kings' is a subject deserving the attention of the Asiatic Society, and in accordance with a despatch which the Court of Directors sent to this country nine years ago respecting the preservation of antiquarian objects.

"Rajmahal will be an important station of the Railway Company and as the space for railway works is limited there, it is to be feared that hereafter men ignorant of the past history of this country and looking on the ruins with a Benthamite eye may cast off all that would interest the love of the past as mere rubbish.

"On the principle that prevention is better than cure, it would be well if steps could be now taken to save some of these 'landmarks on the sea of time.' We have few ruins in the Lower Pro-

vinces to point out to the gaze of the tourist or antiquarian, and these ruins if kept in preservation would be hereafter very interesting to railway travellers and others."

The Secretary explained that a representation had already been made to the Lieut.-Governor on the subject by direction of the Council.

2. From Prof. Anger, Librarian of the German Oriental Society conveying thanks of the Society for Nos. 43 to 74 of the Bibliotheca Indica, and No. VII. of 1853 and I. of 1854 of the Journal.

3. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces. Meteorological Register kept at the Secretariat office of the N. W. Provinces for the month of October, 1854.

4. From H. Piddington, Esq. submitting the following papers, viz.:—

1st. Examination and analysis of a jet coal from the banks of the Teesta River.

2nd. Ditto ditto, two specimens of coal from Ava.

The Curator of the Geological Department and the Librarian submitted reports of additions made in their respective Departments.

LIBRARY.

The additions to the library during the past month have been the following:—

Presented.

Life of Mohammad in Bengali, Calcutta, 1854, 8vo.—BY THE REV. J. LONG.

Selections from the Records of the Bengal Government, No. XVI. 2 copies.—BY THE GOVERNMENT OF BENGAL.

Joseph's Map of the Grand Trunk Road, 3rd Section, Agra to Ferozepore.—BY THE SAME.

Selections from the Records of Government of the North-Western Provinces, Part XVI.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Range of the Thermometer at Nynee Tal, from 1st January to 31st December, 1853.—BY THE SAME.

Recuel des Actes de l'Academie des Sciences, Belles-lettres et Arts de Bordeaux, No. 1 for 1851-52 and Nos. 2, 3 and 4 of 1853.—BY THE ACADEMY.

Selections from the Public Correspondence of the Punjab Administration, No. IX. 4 copies.—BY THE PUNJAB ADMINISTRATION.

Report of the Revenue Administration of the Lower Provinces for the official year 1852-53.—By the Government of Bengal.

Astronomical Observations made at the Hon'ble the East India Company's Observatory at Madras; for 1848—52.—By the Madras Government.

Proceedings of the Royal Society, No. 6.—By the Society.

Másika Patriká, No. IV. 2 copies.—By the Editors.

The Oriental Baptist, No. 95-6.—By the Editor.

Upadeshak, Nos. 95-6.—By the Editor.

The Calcutta Christian Observer, No 180.—By the Editors.

The Oriental Christian Spectator, for Nov. 1854.—By the Editor.

The Bibidhártha Sañgraha, No. 31.—By the Editor.

Purchased.

The Annals and Magazine of Natural History for September, 1854.

Comptes Rendus, Nos. 5 to 10.

Dec. 6th, 1854. Ra'jendrala'l Mittra.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.217	93.5	93.8	81.4	..	..	N.	Clear
2	29.233	93.5	92.5	83.4	..	..	N. E.	⌒ scattered
3	29.273	91.6	91.0	80.9	..	..	..	....
4	29.225	86.7	87.3	82.5	..	..	..	⌒ scattered
5	29.199	87.0	87.0	82.5	..	..	N. E.	Ditto
6	29.183	85.6	86.0	82.4	..	..	N.	⌒ all over
7	29.171	86.6	86.3	81.5	..	..	N. E.	⌒ scattered all over
8	29.145	82.7	83.1	80.5	..	..	N. E.	⌒ all over
9	29.157	84.0	84.7	80.7	..	..	N.	Ditto
10	29.211	86.0	86.5	81.0	..	..	N. W.	Ditto
11	29.229	88.5	89.5	82.0	..	..	E.	⌒ scattered
12	29.161	89.7	90.3	80.4	..	..	N. E.	⌒ Ditto
13	29.023	85.0	84.6	79.5	..	..	N. W.	⌒ all over
14	29.207	85.6	85.0	78.0	..	..	..	Ditto
15	29.205	85.0	84.6	79.2	..	..	..	Ditto
16	29.241	84.7	84.4	80.0	..	..	N. W.	Clear
17	29.251	84.0	83.6	80.0	..	..	..	⌒ all over
18	29.295	84.5	85.2	79.8	..	..	N. W.	⌒ scattered
19	29.327	85.1	85.2	80.0	..	..	N. W.	Clear
20	29.345	85.0	85.4	78.0	..	..	N. W.	⌒ scattered
21	29.389	85.5	86.2	77.0	..	..	N. W,	Clear
22	29.397	86.2	86.2	77.0	..	..	N. W	⌒ scattered
23	29.367	87.8	88.0	79.4	..	..	N.	Ditto
24	29.375	88.5	88.7	79.0	..	..	N. W	⌒ Ditto
25	29.409	89.0	90.0	80.5	..	..	N. E.	⌒ Ditto
26	29.405	88.4	89.0	80.0	..	..	N.	⌒ Ditto
27	29.373	80.0	80.0	75.0	..	..	E.	⌒ Ditto
28	29.429	77.5	77.7	73.5	..	..	N. E.	⌒ Ditto all over
29	29.393	78.3	78.5	74.5	..	..	N. W.	⌒ Ditto
30	29.369	82.7	83.5	74.0	..	..	N. W.	⌒ Ditto
Mean.	29.273	85.9	86.1	80.1	..	..	..	....

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.193	95.7	96 4	79.5	..	..	N.	Clear
2	29.205	95.0	95.0	82.5	..	..	N. E.	∿ scattered
3	29.239	89.0	87.2	81.5	..	..	S. E.	∿ Ditto
4	29.193	89.0	89.5	82.8	..	..	S. E.	Ditto towards hor.
5	29.163	88.8	89.0	82.5	..	..	N. E.	⌣ scattered
6	29.151	87.0	87.8	82.4	..	..	N.	∿ Ditto
7	29.147	85.8	79.9	79.5	..	..	N. E.	∿ raining
8	29.119	84.5	84.9	80.6	..	..	N. E.	∿ all over
9	29.131	86.7	87.0	81.2	..	..	N.	Ditto
10	29.193	88.2	88.7	81.5	..	..	N.	Ditto
11	29.207	89.9	90.4	81.5	..	..	E.	∿ scattered
12	29.135	90.7	91.0	80 5	..	..	N. E.	∿ Ditto
13	28.999	81.5	79.4	76.0	..	..	N. W.	∿ all over
14	29.193	87.2	86.6	78.5	..	..	..	Ditto
15	29.201	85.9	85.6	80.0	..	..	..	Ditto
16	29.207	86.5	86.4	79.5	..	..	N. W.	∿ towards W.
17	29.213	84.9	84.4	80.2	..	..	W.	∿ all over
18	29.277	86.0	86.4	79 5	..	..	N. W.	∿ scattered
19	29.309	86.2	86.2	80.0	..	..	N. W.	∿ all over
20	29.333	86.8	87.1	78.8	..	..	N. W.	∿ scattered
21	29.363	88.5	89.0	77.5	..	..	N. W.	Ditto
22	29.375	87.8	87.8	77.7	..	..	N. W.	Ditto
23	29.333	89.1	89.5	80.0	..	..	N.	Ditto
24	29.329	91.0	91.4	80.6	..	..	W.	∿ Ditto
25	29.379	90.7	91.2	79.2	..	..	N. E.	∿ Ditto
26	29.361	89.0	89.5	80.0	..	..	N.	∿ Ditto
27	29.365	81.7	81.9	76.0	..	..	E.	Ditto
28	29.403	79.0	79.3	74 5	..	..	N. E.	Ditto
29	29.371	80.7	81.3	76.0	..	..	N. W.	Ditto
30	29.355	83.8	84.2	74.5	..	..	N. W.	Ditto
Mean.	29.248	87.2	87.1	79.4	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauge.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.117	100.9	100.0	81 8	99.5	82.5	91.0	Clear [W.	..	N.
2	29.133	96.9	94.5	84.0	94.0	82.0	88.0	∿ towards	..	N. E.
3	29.145	90.5	90.3	81.5	91.0	81.0	86.0	∿ do. all ovr.	..	S. E.
4	29.119	85.9	85.0	80.6	87.0	78.5	82.75	∿ scattered towards hor.	0.732	..
5	29.105	87.5	84.5	80.5	86.0	78 0	82.0	∿ all over	0.102	N. E.
6	29.065	88.8	87.5	80.5	86.6	77.2	81.9	Ditto	..	E.
7	28.079	83.0	82.9	79.5	83.0	77.5	80.25	Ditto	0.442	..
8	29.015	86.5	85.5	81.4	85 0	76.0	80.5	Ditto	..	N. E.
9	29 035	87.9	88.0	82.0	88.4	76.0	82.2	Ditto	..	N.
10	29.103	90.7	90.4	82.1	90 0	76.5	83.25	Ditto	..	N.
11	29.103	92.8	92 8	82.4	92.3	77.3	84.8	∿ scattered	..	E.
12	29.055	93.0	92.2	80.0	93.0	78.0	85.5	∿ Ditto	..	E.
13	28.931	81.0	79.8	76.0	86.0	77.0	81.5	∿ all over	2.082	N.W.
14	29.161	88.0	87.0	79.0	88.0	77.2	82.6	Ditto	0.052	..
15	29 117	87.5	87.0	80.5	88.5	77.4	82.95	∿ scattered	..	N.W.
16	29.189	87.9	87 6	79.6	86.9	77.0	81.95	∿ twds. W.	..	N.W.
17	29.197	86.0	86.5	81.0	80.0	77.2	78 6	∿ all over	..	W.
18	29.195	89.5	88.5	80.1	88.0	77.0	82.5	∿ scattered	0.512	N.W.
19	29.245	89.5	89.3	80.4	89.2	77.5	83.35	∿ Ditto	..	N.W.
20	29.261	91.0	90.6	81.9	91.0	78.0	84.5	Ditto	..	N.W.
21	29.289	92.6	92.0	80.6	91.8	78.0	84.9	Ditto	..	W.
22	29.291	90.8	89 4	79 5	89.2	78.0	83 6	Ditto	..	N.
23	29.227	93.0	91.7	80.2	92.0	76.0	84.0	Ditto	..	N.
24	29.249	94.7	93 3	81.0	94.0	76.2	85.1	∿ Ditto	..	N.W.
25	29.309	92.1	91.4	80.6	92.0	76.5	84.25	Ditto	..	N. E.
26	29.325	79.8	79.0	75.8	90.0	77.0	83.5	∿ all over	1.082	N. E.
27	29.301	85.2	85.6	76.3	86.0	76.6	81.3	∿ scattered	..	N.W.
28	29.329	81.5	80.4	75.9	80.0	77.0	78.5	∿ Ditto	..	E.
29	29.317	84 0	84.9	76.7	84.3	76.2	80.25	∿ Ditto	..	N W.
30	29.283	89.9	89.9	75.0	89.5	77.4	83.45	Ditto	..	N.W.
Mn.	29.176	88.9	88.2	79.8	88.7	77.5	83.16	..	5.004	..

Metcorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29 371	83.3	83 7	74.2	..	..	..	⌒ scattered
2	29.375	86.0	86.4	75.5	..	..	W.	Clear [in zenith.
3	29.419	86.8	88.0	73.0	..	..	N. W.	_ very few scattered
4	29.431	85.0	86.5	70.5	..	..	N. W.	Clear
5	29.441	83.2	84.7	72.0	..	..	N. W.	⌒ scattered
6	29 397	81.9	81.9	77.6	..	..	N.	_ all over
7	29.355	78.5	78 5	76.6	..	..	N. E.	Ditto
8	29 367	79.5	80.0	77.0	..	..	E.	Ditto
9	29.405	82.2	82.4	77.5	..	..	S. E.	_ scattered
10	29 505	83.5	83.7	77.8	..	..	W.	⌒ Ditto
11	29.451	81.5	81.8	74.5	..	..	N. W.	_ Ditto
12	29.419	80.8	81.5	74.8	..	..	N. W.	Clear
13	29.451	82.7	83.0	74.0	..	..	S. W.	Ditto
14	29 517	83 0	83.4	71.8	..	..	W.	Ditto
15	29.505	81 0	81.3	69.5	..	..	..	Ditto
16	29.529	78.9	80.9	64.0	..	..	N. W.	Ditto
17	29.509	78.0	80.3	64.0	..	..	N. W.	Ditto
18	29.505	78.0	79.1	65.7	..	..	N. W.	Ditto
19	29.493	79.9	81.7	64.9	..	..	N.	Ditto
20	29.529	77.0	79.5	64.7	..	..	N. W.	Ditto
21	29.547	77.1	78.7	64.0	..	..	N.	Ditto
22	29.507	76.0	76.4	63.0	..	..	..	Ditto
23	29.497	75.0	76.8	65.0	..	..	N.	Ditto
24	29.515	74.5	77.0	64 0	..	..	N. W.	Ditto
25	29.539	77.0	79.5	63.0	..	..	N. W.	Ditto
26	29.531	76.2	78.0	63.0	..	..	N. W.	Ditto
27	29.511	73 0	74.4	58.0	..	..	N. W	Ditto
28	29.539	72.5	75 0	59.0	..	..	N. W.	Ditto
29	29.547	73.8	76.0	60.5	..	..	N. W.	Ditto
30	29.555	75.5	78.0	66 5	..	..	N. E.	Ditto
31	29.533	74.0	74.0	70.0	..	..	E.	_ all over
Mean.	29.477	79.2	80.3	68.9	..	..	..	....

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.353	84.6	85.0	74.6	..	..	..	∿ scattered
2	29.367	88.7	89.5	74.8	..	..	N. W.	Clear [in zenith
3	29.387	89.7	91.0	73.5	..	..	N. W.	\ very few scattered
4	29.405	87.5	89.2	71.1	..	..	N. W.	Clear
5	29.383	87.0	88.0	72.0	..	..	N. W.	∿ scattered
6	29.373	84.8	85.4	77.6	..	..	N.	\∿ all over
7	29.309	79.8	78.5	76.6	..	..	N. E.	Ditto
8	29.329	81.6	82.3	77.5	..	..	E.	Ditto
9	29.391	85.3	85.3	78.5	..	..	S. E.	∿ scattered
10	29.471	85.5	85.8	77.9	..	..	W.	Ditto
11	29.417	83.5	83.9	74.5	..	..	N. W.	Ditto
12	29.395	84.2	84.7	74.9	..	..	..	Clear
13	29.433	86.3	86.5	74.0	..	..	W.	Ditto
14	29.503	85.5	86.6	71.9	..	..	W.	Ditto
15	29.493	83.5	83.9	69.9	..	..	.	Ditto
16	29.513	84.5	85.5	64.4	..	..	N. W.	Ditto
17	29.491	83.5	85.1	64.5	..	..	N. W.	Ditto
18	29.475	82.3	84.2	65.7	..	..	N. W.	Ditto
19	29.475	82.5	83.4	66.0	..	..	N.	Ditto
20	29.505	81.7	83.0	65.0	..	..	N.	Ditto
21	29.527	79.9	80.9	63.4	..	..	N.	Ditto
22	29.493	79.0	79.5	63.5	..	..	..	Ditto
23	29.471	80.3	81.5	65.0	..	..	N.	Ditto
24	29.501	79.0	80.3	64.2	..	..	N. W.	Ditto
25	29.501	82.0	84.5	63.5	..	..	N. W.	Ditto
26	29.495	80.7	81.3	63.5	..	..	N. W.	Ditto
27	29.483	78.9	80.6	60.5	..	..	N. W.	Ditto
28	29.523	77.5	79.0	59.5	..	..	N. W.	Ditto
29	29.495	78.0	80.1	60.8	..	..	W.	Ditto
30	29.481	80.0	81.1	67.8	..	..	E.	Ditto
31	29.497	73.7	71.9	69.9	..	..	E.	\∿ raining
Mean.	29.449	82.6	83.4	69.0	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.

Maximum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 in. from the ground.	Direction of the Wind.
1	29 303	90.2	90.7	95.5	90.5	77.2	83.85	∩ scattered	..	..
2	29.315	93.2	92.5	77 4	92.0	76.7	84.35	_ scattered	..	N.W.
3	29.319	94.0	94.2	73.9	93.8	76.0	84.9	Clear	..	N.W.
4	29 333	93.0	93.4	71.5	93.0	76.0	84.5	Do. [wards W.	..	N.W.
5	29.345	90.9	91.4	72.0	91.0	75.8	83.4	_ scattered to-	..	N.W.
6	29.269	88.3	88 3	78.2	88.0	75.4	81.7	∩ scattered	..	N. E.
7	29.219	79.5	78 0	75.2	77.7	75.0	76.35	....	..	..
8	29.225	86 0	86.3	77.0	86.0	75.0	80.5	Ditto	..	E.
9	29.341	88.3	87.8	78.9	87.5	75.6	81.55	Ditto	..	S. E.
10	29 399	89.5	89.5	78.4	89.0	75.5	82.25	Ditto	..	S.W.
11	29.351	85.8	86.4	77.2	86.0	74.0	80.0	Ditto	..	N.W.
12	29.347	88.2	87.7	74.4	88.5	73.0	80.75	_ Ditto	..	N.W.
13	29.391	90 8	91.0	72.9	90.6	73.4	82.0	Clear	..	W.
14	29 459	90.9	91.4	70.0	91.0	72.8	81.9	Ditto	..	W.
15	29.447	88.2	88.6	70.3	88.0	69.0	78.5	Ditto	..	..
16	29.471	88.5	88.0	65.5	88.9	68 0	78.45	Ditto	..	N.W.
17	29.437	88.6	88.5	65.0	88.5	67.4	77.95	Ditto	..	N.W.
18	29.405	87.7	88.1	67.3	88.0	67.0	77.5	Ditto	..	W.
19	29.411	87.9	88.5	66.4	88 0	68.5	78.25	Ditto	..	N.W.
20	29.455	86.8	87.6	67.4	87.5	70.0	78 75	Ditto	..	N.
21	29.471	87.0	87.4	63.0	87.5	69.6	78.55	Ditto	..	N.W.
22	29.443	86.0	86.6	63.7	86.5	65.3	75 9	Ditto	..	..
23	29.409	85.2	85.4	66.6	85.5	64.0	74.75	Ditto	..	N.W.
24	29.445	85.0	85.8	64.5	85.4	63.6	74.5	Ditto	..	N.W.
25	29.447	87.0	86.7	68.5	86.7	64.7	75.7	Ditto	..	N.W.
26	29.417	86.6	86.3	63.2	86.4	64.5	75.45	Ditto	..	N.W.
27	29.434	84.8	84.6	60.0	84.5	63.0	73 75	Ditto	..	N.W.
28	29.477	83.0	82.4	62.2	82.7	62.0	72.35	Ditto	..	N.W.
29	29.423	88.0	88.2	62.5	88.0	61.0	74.5	Ditto	..	N.W.
30	29.443	84.0	83.8	68.5	84.5	61.0	72.75	Ditto	..	E.
31	29.437	73.0	72.2	69.9	72.3	63.0	67.65	_ scattered	..	..
Mean.	29.375	84.9	85.0	68.2	87.2	69.7	78.49	....	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Direction of Wind.	Quantity of Rain.	Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.			
1	29.505	70.0	70.5	68.2	E.	..	∿ all over
2	29.471	73.5	74.5	69.0	E.	..	∼ scattered
3	29.497	71.5	70.9	67.5	E.	..	∿ all over
4	29.525	74.8	75.2	68.4	N. E.	..	∼ very few scattered
5	29.505	75.3	75.2	68.4	N. E.	..	∿ all over
6	29.471	74.2	76.0	64.0	N. W.	..	∼ scattered
7	29 525	70.5	71.2	61.2	N. W.	..	Clear
8	29.581	73.0	74.8	60.0	N. W.	..	Ditto
9	29.647	71.6	73.4	57 4	N. W.	..	Ditto
10	29.727	67.0	67.9	56.0	N. W.	..	Ditto
11	29.727	69.0	71.5	55.0	N. W.	..	Ditto
12	29.643	72.0	73.5	57.0	N. W.	..	Ditto
13	29.627	70.5	72.3	57.2	N. W.	..	Ditto
14	29.605	68.0	69.2	58.4	N.	..	∽ scattered
15	29.597	69.5	70.9	59.4	S.	..	∼ Ditto
16	29.647	72.0	73 5	61.5	S. E.	..	Ditto
17	29.652	69.5	70.9	57.5	N. W.	..	Clear
18	29.601	67.7	69.0	54.0	N. W.	..	Ditto
19	29.615	71.2	73.0	54.3	N. W.	..	Ditto
20	29.633	65.8	67.4	56.5	N. W.	..	Ditto
21	29.663	67.0	68.0	55.0	N. W.	..	Ditto
22	29.687	65.8	67.3	54.8	S. W.	..	Ditto
23	29.663	66.0	67.9	55.2	N. W.	..	Ditto
24	29.661	65.0	66.3	55.9	N. W.	..	Ditto
25	29.705	65.5	67.6	60.1	N. E.	..	Ditto
26	29 699	65.0	66 5	56.0	N. E.	..	Ditto
27	29.641	67.5	68.4	60.0	N. E.	..	Hazy
28	29.607	65.5	66.6	57.0	N. E.	..	∽ scattered
29	29.623	66.0	67.0	57.0	N. W.	..	Ditto
30	29.642	67.0	68.9	59.0	N. E.	..	Ditto
Mean.	29.613	69.2	70.5	59.1	..	..	....

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

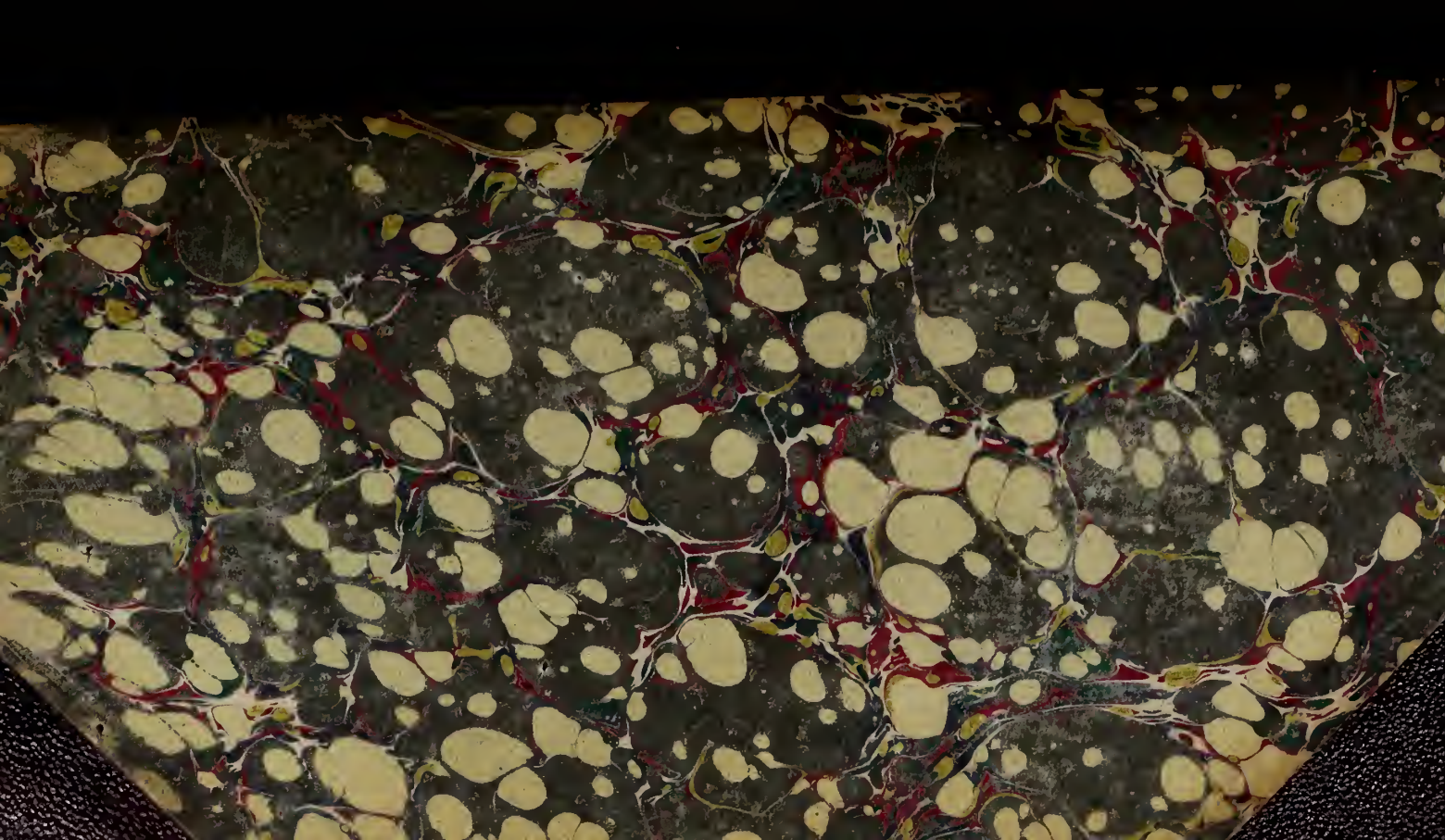
Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Direction of Wind.	Quantity of Rain.	Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.			
1	29.465	72.3	72.5	69.0	E.	..	⌇ all over
2	29.421	75.8	77.8	68.4	E.	..	∼ scattered
3	29.465	72.0	72.0	67.0	E.	..	⌇ all over
4	29.487	77.0	77.9	67.4	N. E.	..	∼ very few scattered
5	29.439	77.4	79.0	63.0	N. W.	..	Clear
6	29.455	78.5	80.3	64.0	S. E.	..	Ditto
7	29.505	75.4	76.4	63.5	N. W.	..	Ditto
8	29.559	77.0	78.6	60.0	N. W.	..	Ditto
9	29.637	75.7	76.3	58.4	N. W	..	Ditto
10	29.715	73.9	75.4	58.0	N. W.	..	Ditto
11	29.695	74.8	76.2	56.5	N. W.	..	Ditto
12	29.611	75 5	77.0	58.0	N. W.	..	\ scattered
13	29.601	76.3	77.5	58.5	N. W.	..	Clear
14	29.589	74.0	75.5	59.5	N.	..	⌇ scattered
15	29.569	75.8	77.5	61.6	S. E.	..	∼ Ditto
16	29.615	76.5	78.7	63.0	N.	..	Ditto
17	29.615	77.0	78.0	57.0	N. W.	..	Clear
18	29.583	73.5	75.0	55.2	N. W.	..	Ditto
19	29.555	74.5	76.5	57.0	N. W.	..	Ditto
20	29.599	71.2	72.4	57.5	N. W.	..	Ditto
21	29.637	70.2	71.9	56.5	N. W.	..	Scattered
22	29.655	72.0	72.4	56.5	S. W.	..	Clear
23	29.625	71.5	73.0	57.1	N. W.	..	Ditto
24	29.637	70.5	71.3	60.0	N. W.	..	Ditto
25	29.671	70.2	72.7	60.9	N. E.	..	Ditto
26	29.639	70.0	72 2	60.0	N. E.	..	Ditto
27	29.607	71.0	71.2	61.1	N. E.	..	Hazy
28	29.567	70.2	70.2	58.5	N. E.	..	⌇ scattered
29	29.547	70.9	72.4	58.5	N. W.	..	Ditto
30	29.617	73.0	73.7	60.5	E.	..	Ditto
Mean.	29.579	73.7	75.0	60.4	..	..	....

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Direction of Wind.	Quantity of Rain.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.			
1	29.415	76.5	76.0	71.0	76.0	63.5	69.75	⌇ all over	E.	..
2	29.361	79.5	79.5	69.2	79.3	64.0	71.65	⌇ scattered	E.	..
3	29.427	74.0	73.8	68.2	73.5	63.7	68.6	⌇ all over [ed	E.	..
4	29.421	82.0	82.0	68.8	81.6	63.0	72.3	⌒ very few scatter-	N.	..
5	29.365	82.2	82.5	67.2	82.0	66.0	74.0	⌒ scattered	N.W.	..
6	29.379	81.9	80.7	64.0	81.4	64.4	72.9	Ditto .	S. E.	..
7	29.467	81.4	81.4	63.9	80.9	62.0	71.45	Clear	N.W.	..
8	29.505	81.5	81.4	61.9	81.4	59.0	70.2	⌒ scattered	N.W	..
9	29.597	80.5	80.0	58.0	80.4	56.0	68.2	Clear	N.W.	..
10	29.659	79 7	79.2	57.5	79.4	55.0	67.2	Ditto	N.W.	..
11	29.637	80.0	79.5	58.5	80.0	55.2	67.6	Ditto	N.W.	..
12	29.591	78.8	78.5	58.4	78.3	54.1	66.2	⌣ scattered	N.W.	..
13	29.539	83.9	84.0	60.6	84.5	55.2	69.85	Clear	N.W.	..
14	29.509	80.0	81.2	61.2	81.2	54.6	67.9	⌣ scattered	N.	..
15	29.525	80.5	80.5	64.4	80.2	60.0	70.1	⌒ Ditto	S. E.	..
16	29.561	82.7	83.2	63.1	83.6	61.5	72.55	Clear	N.W.	..
17	29.565	80.8	80.5	58.5	81.0	61.0	71.0	Ditto	N.W.	..
18	29 509	78.9	78.9	57.3	78.9	54.0	66.45	Ditto	N.W.	..
19	29.517	79.4	79.6	58.0	79.6	54.2	66.9	Ditto	N.W.	..
20	29.535	76.1	76.4	58.7	76.0	55.0	65.5	Ditto	N.W.	..
21	29.595	76.0	77.5	59.0	77.0	53.2	65.1	Ditto	N.W.	..
22	29.601	77.9	78.5	57.9	78.5	51.5	65.0	Ditto	N.W.	..
23	29.589	76 4	76.4	58.5	76.0	51.0	63.5	Ditto	N.W.	..
24	29.583	74.8	74.4	61.3	75.0	51.0	63.0	Ditto	S. E.	..
25	29.631	75.0	75.2	61.8	75.4	52.5	63.95	Ditto	N. E.	..
26	29.577	75.8	76.5	60.5	75.4	52.0	63 7	Ditto	N. E.	..
27	29.553	72.9	72.3	61.5	72.0	53.5	62.75	⌇ all over	N. E.	..
28	29.519	74.2	73.9	57.8	73.9	52.0	62.95	⌇ scattered	N.W.	..
29	29.525	74.5	73.7	60.0	74.9	51.4	63.15	⌣ Ditto	N.W.	..
30	29.549	76.0	76.0	61.3	76.5	52.3	64.4	....	..	..
Mean.	29.526	78.6	78.5	61.6	78.4	56.7	67.6	....	..	..

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